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A-E PERFORMANCE SPECIFICATION

PROJECT FILE NO. 021052

OU 7-10 GLOVEBOX EXCAVATOR METHOD PROJECT

Retrieval Confinement Structure

Prepared for:
U.S. Department of Energy
Idaho Operations Office
Idaho Falls, Idaho

Idaho National Engineering and Environmental Laboratory

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DOCUMENT MANAGEMENT CONTROL SYSTEM (DMCS)
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REVIEW AND APPROVAL SIGNATURES
Denote R for review concurrence, A for approval, as appropriate.

8. Type or Printed Name / Signature	9. R/A	9. Date	10. Organization/ Discipline
Steven A. Davies, P. E.	A	4/04/02	WAG 7/10 Project - 31E0 Project Engineer
Scott A. Jensen, P. E.	A	4/4/2002	WAG 7/10 Project - 31E0 Structural Design Lead Engineer
David L. Stephens, P. E.	R	4/04/02	WAG 7/10 Project - 31E0 RCS Structural Design
Patrick W. Bragassa, P. E.	R	4/4/02	Design Engineering - 6770 Independent Peer Reviewer
Stephanie L. Austad, P. E.	R	4/4/02	Design Engineering - 6770 Engineering Group Supervisor Reviewer
11. Document Control Release Signature:			

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1. SCOPE

1.1 General

The work includes design, fabrication, inspection, testing, shipping, handling, and erection supervision of a complete modular panel retrieval confinement structure (RCS) for the OU7-10 Glovebox Excavator Method Project, as shown on the attached drawings. Included are design and fabrication of personnel doors, windows, portholes, interface elements, and all associated hardware, seals, and gaskets. Also included are all accessories and items necessary for the scope and intended use and as specified herein. Unless specifically noted otherwise in this specification the acronym RCS will refer to the group of areas shown on the drawings as (RCS, transfer vestibule overburden area, personnel access areas, and personnel monitoring area)

1.2 Work Included

1.2.1 Design Phase

The design of the RCS includes, but is not limited to, the preparation of calculations and drawings.

The deliverables required at the end of the design phase include but are not limited to “D” size shop drawings including electronic files for the drawings, approved design calculations, erection instructions, and peer review certification as described in the "Submittals" section below.

The design phase will be considered complete when all the vendor data items listed in the Section 4, Submittals, have received a "work may proceed" disposition.

1.2.2 Fabrication Phase

The RCS shall be fabricated upon completion of the design phase and shipped to the INEEL for erection. In-plant inspection of the fabrication process shall be made by Bechtel BWXT (BBWI) quality representatives and design engineers, in addition to the inspections performed by the Supplier.

1.2.3 Installation Phases

On-site Supplier support shall be provided for a period of two to three weeks on two separate occasions, separated by approximately six months. First, the confinement Supplier shall provide a full-time installation consultant for a period of approximately three weeks to oversee the erection of the confinement structure. The INEEL Site Stabilization Agreement requires site construction to be done by construction trades with workers supplied by the local trade unions. Therefore, the building will be assembled by local union ironworkers.

Second, the confinement Supplier shall provide a full-time installation consultant for a period of approximately two weeks to oversee the sealing of joints and penetrations. The consultant shall also be present to observe the testing phase following the sealing of the joints and penetrations.

1.3 Work Not Included

1.3.1 Erection

The erection of the RCS is not included in the scope of work included in this specification.

1.3.2 Final Structure Testing

BBWI will be responsible for carrying out the final structure testing. This testing will have at least four phases.

First, the structure shall be pressurized to -0.5 in, water column and subjected to a bubble test (use "Snoop" or equal) at all the panel joints and penetration perimeters. Additional caulk and tape shall be applied as necessary to meet acceptance criteria as follows: No observed bubble of 1 mm diameter or greater in any 10 second period.

Second, a structural and joint seal integrity pressure test up to a maximum negative pressure of 4.0 inches, water column, shall be conducted for the RCS (excludes the transfer vestibule overburden, personnel access, and personnel monitoring areas).

Third, the first pressure test shall be repeated and the impact of the second test on joint seal integrity shall be evaluated.

Fourth, the RCS panel joints and penetration perimeters (excluding the transfer vestibule overburden, personnel access, and personnel monitoring areas) shall be tested with a "smoke pencil" under a positive pressure of 0.5 inch, water column. Additional caulk and tape shall be applied as necessary to meet acceptance criteria as follows: No smoke applied at a joint or penetration is observed as moving under a pressure differential from the inside of the confinement to the outside.

2. QUALIFICATIONS

2.1 General

Supplier shall be regularly engaged in the design and fabrication of modular panel confinement type structures. The confinement supplier shall have at least twelve years experience in designing, manufacturing, and field servicing pre-engineered, modular panel confinements for use in radiological contamination areas. All design work shall be accomplished under the responsible charge of a Professional Engineer registered in the State of Idaho to

practice civil or structural engineering with at least 5 years experience in the design of this type of structure. All drawings shall be compatible with the latest version of AutoCad and prepared by experienced drafters with at least 2 years experience working on this type of structure. Erection consultation will be performed by a person with at least 10 years experience installing structures of this type.

3. APPLICABLE CODES, PROCEDURES, AND REFERENCES

3.1 National Design Codes and Material Specifications

AMERICAN INSTITUTE OF STEEL CONSTRUCTION (AISC)

AISC (ASD)	Specification for Structural Steel for Buildings-- Allowable Stress Design (ASD)

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

A 6	General Requirements For Rolled Steel Plates, Shapes, Sheet Piling, and Bars For Structural Use.
A 36	Structural Steel
A 167	Stainless Steel and Heat Resisting Chromium Nickel Steel Plate, Sheet, and Strip
A 240	Heat-Resisting Steel Plate, Sheet, and Strip For Fusion Welded Unfired Pressure Vessels
A 276	Stainless Steel Bars and Shapes
A 307	Carbon Steel Bolts and Studs, 60,000 psi Tensile Strength
A 500	Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes
A 529	Standard Specification for High-Strength Carbon-Manganese Steel of Structural Quality
A 563	Carbon and Alloy Steel Nuts
A 992	Steel for Structural Shapes for Use in Building Framing

AMERICAN SOCIETY OF CIVIL ENGINEERS (ASCE)

ASCE 7-98	Minimum Design Loads for Buildings and Other Structures

AMERICAN WELDING SOCIETY (AWS)

AWS B2.1	Specification for Welding Procedure and Performance Qualification
AWS D1.1	Structural Welding Code – Steel
AWS D1.6	Structural Welding Code – Stainless Steel

CODE OF FEDERAL REGULATIONS (CFR)

29 CFR 1910 Industrial Safety and Health Standards

INTERNATIONAL CONFERENCE OF BUILDING OFFICIALS (ICBO)

ICBO IBC International Building Code 2000

3.2 Drawings

See drawings attached as Appendix B.

4. SUBMITTALS

4.1 General

General Procedures: Vendor data, whether prepared by the Supplier or Supplier's subtier shall be submitted as instruments of the Supplier. Therefore, prior to submittal, the Supplier shall ascertain that material and equipment covered by the submittal and the contents of the submittal itself, meet all the requirements of the subcontract specifications, drawings, or other contract documents.

Each submittal shall contain identification for each separable and separate piece of material or equipment, and literature with respect to the information provided in the specification and on the Vendor Data Schedule. Submittals shall be numbered consecutively for each different submittal.

Vendor Data Schedule: Vendor Data required by this specification or the drawings to support design, construction, and operation of the project is identified on the Vendor Data Schedule included in Appendix A. The Vendor Data Schedule provides a tabular listing by item number, drawing or specification reference, and description of the item or service. The type of submittal is identified by a "Vendor Data Code", and the time required to submit the item is identified by a "When to Submit" code. An "Approval" code specifies whether the submittal is for Mandatory Approval or for Information Only. One copy of routine paper or electronic file submittals are required; additional copies may be required by the Vendor Data Schedule. Electronic file submittals are preferred.

Construction Vendor Data Transmittal and Disposition Form: All vendor data shall be submitted to the Contractor using the Construction Vendor Data Transmittal and Disposition Form. The form provides the Supplier a convenient method to submit vendor data and provides the Contractor a means of dispositioning the submittal. The Supplier shall list the Vendor Data Schedule item number, a Vendor Data Transmittal tracking number (if applicable), the drawing or specification number reference, a Tag Number (if applicable), the submittal status (e.g., Mandatory Approval, Information Only, Re-submittal, or Or-equal), the Revision Level, and the item Description. The description should include the heat or lot number for items requiring Certified Mill Test Reports.

Disposition by the Contractor: The Contractor's comments and required action by the Supplier will be indicated by a disposition code on the submittal. The disposition codes will be classed as follows:

(A) "Work May Proceed." Submittals so noted will generally be classed as data that appears to be satisfactory without corrections.

(B) "Work May Proceed with Comments Incorporated. Revise Affected Sections and Resubmit." This category will cover data that, with the correction of comments noted or marked on the submittal, appear to be satisfactory and require no further review by the Contractor prior to construction. Revised drawings shall be provided upon request.

(C) "Work May NOT Proceed. Revise and Resubmit." Submittals so dispositioned will require a corrected resubmittal for one of the following reasons:
1) Submittal requires corrections, per comments, prior to final review.
2) Submittal data incomplete and requires more detailed information prior to final review.
3) Submittal data does not meet Subcontract document requirements.

(D) "Accepted for Use. Information Only Submittal." Submittals so dispositioned will generally be classified as Information Only for as-specified material and equipment.

Mandatory Approval coded vendor data will be reviewed by the Contractor and receive an A, B, or C disposition. Information Only submittals without comments will receive a D disposition. A, B, and C coded dispositioned submittals will be returned to the Supplier. D dispositioned submittals will not be returned to the Supplier. The Contractor may provide internal review of Information Only submittals. In the event that comments are generated on an Information Only submittal, the submittal may be dispositioned B or C and returned to the Supplier for appropriate action. Acknowledgment of receipt of dispositioned vendor data by the Supplier will not be required.

The Contractor will return dispositioned submittals with reasonable promptness. The Supplier shall note that a prompt review is dependent on timely and complete submittals in strict accordance with these instructions.

All Vendor Data must be dispositioned A or D before the subcontract can be considered complete.

4.2 Qualifications

Submit a letter certifying that the Supplier qualifications listed under Section 2.1 will be met and maintained during the performance of this specification.

4.3 Design Calculations

Design calculations documenting the detailed design of the confinement structure shall be submitted. Design loads and load combinations considered shall be clearly addressed. Each component of the structure shall be shown to be adequate for all applicable loads. All final submittals of calculations shall be provided in a loose-leaf binder and shall include the title and purpose of the calculation, a table of contents or index, complete list of references, design basis and complete list of assumptions (if any), methodology, and sufficient information to allow independent verification of the calculation. Where computer software is used the following shall be documented: 1) program name, 2) program version number, 3) reference to program's verification and validation information, 4) description of the model, including where appropriate, plots showing the overall model and plots showing specific details of complex or unusual features and their modeling, 5) discussion of program options and/or solution methods, 6) inputs and outputs, 7) discussion of results obtained, including appropriate plots and/or comparison tables. All calculations shall be performed under the responsible charge of a Professional Engineer registered in the State of Idaho to practice civil or structural engineering. The calculations shall be stamped by this same professional engineer. The calculation report shall also include an indication that the calculations have gone through a detailed review or check.

4.4 Peer Review of Design Calculations

Submit a letter from an independent engineer certifying that all aspects of the seismic design have been peer reviewed and that resulting comments have been satisfactorily resolved and incorporated into the design calculations. The review should include design philosophy, structural system, construction materials, design criteria used, and other factors pertinent to the seismic capacity of the facility. The review need not provide a detailed check but rather an overview to help identify oversights, errors, conceptual deficiencies, and other potential problems that might affect facility performance during an earthquake. The peer review is to be performed by independent, qualified personnel. If the peer reviewer is from the same company/organization as the designer/evaluator, he must not be part of the same program where he could be influenced by cost and schedule considerations. Individuals performing peer reviews must be degreed civil/structural engineers with 5 or more years of experience in seismic

evaluations. A resume listing experience details shall be attached to the submitted letter of certification.

4.5 Shop Drawings

Submit "D" size shop drawings showing layouts, member sizes, panel thickness, weld details, rivet size, type, and spacing details, and other fabrication details (including penetration framing details) to be used by the fabricator in making the modular panels. A method for identifying "structural welds" per AWS D1.1 shall be devised and clearly shown on the shop drawings. All drawings shall be prepared under the responsible charge of and stamped by a Professional Engineer registered in the State of Idaho to practice civil or structural engineering.

4.6 Erection Drawings

Submit erection drawings showing complete erection layouts, erection details (including foundation attachment and sealing), and any special rigging diagrams.

4.7 Erection Instructions

Submit complete installation instructions, special rigging procedures, recommended erection tools, and foundation attachment details. The confinement may be subjected to wind loads during erection. Erection instructions shall include recommendations for the application and removal of temporary bracing. Information relating to recommended cleaning procedures, joint caulking methods, and joint tape sealing techniques (i.e. off-set layers, double layers) shall be included. All drawings shall be stamped by a Professional Engineer registered in the State of Idaho to practice civil or structural engineering.

4.8 Welder Qualifications

Submit welder qualifications for approval prior to performance of any welding.

4.9 Weld Procedures

Submit welding procedure specifications and procedure qualification records. These procedures shall be referenced on the shop drawings.

4.10 Nondestructive Examination Procedures

Submit nondestructive examination procedures that establish detailed inspection procedures and acceptance criteria for the nondestructive examination required in accordance with the requirements specified in Section 7, Quality Assurance.

4.11 Inspector Qualifications

Submit Supplier's nondestructive examination personnel qualification records. The Supplier's nondestructive examination (including visual examination) personnel shall be qualified for the applicable nondestructive testing method in accordance with the requirements of ASNT SNT-TC-1A for Levels I, II, or III as applicable. Qualification as an AWS Certified Weld Inspector is an acceptable alternative for visual examinations of welds.

4.12 Certificates of Conformance

The Supplier shall obtain and furnish certifications from its suppliers that the following items conform to the material requirements specified herein and in the each supplier's engineering documents: stainless steel panels, structural framing members, bolts, nuts, rivets, doors, Lexan^{TM}, sealing tape, and sealing gaskets. Supplier certification shall be documented utilizing Contractor Form 540.04, Certificate of Conformance, as included in Appendix G. Certification shall be complete, accurate, legible, and reproducible. Incomplete or inaccurate certifications will be refused.

4.13 Spares and Replacement Parts

The Supplier shall submit a Recommended Spare and Replacement Parts List(s). The list shall provide the name and address of the original supplier of each spare and/or replacement part, the part's drawing and/or specification identity and QA data, and the part's estimated procurement lead time.

4.14 Manufacturing, Inspection, and Test Plan

The Supplier shall submit a manufacturing, inspection, and test plan. The plan shall detail the fabrication, assembly, installation, inspections, and/or tests to be performed (for inspections and test plan portion see requirements outlined in Section 5.9, Special Inspection and Test Plan). The plan shall be submitted prior to Supplier initiation of any manufacturing, inspection, or test activity for incorporation of Contractor source inspection hold points.

4.15 Inspection Report

The Supplier shall submit an inspection report detailing the results of the nondestructive inspections completed prior to delivery on-site and as outlined in Section 7, Quality Assurance.

4.16 Mockup Study Report

The Supplier shall submit a study report detailing the results and lessons learned from the mockup study including structural/joint seal integrity test, system leakage tests, and "smoke pencil" test as outlined in Section 1.3.2, Final Structure Testing. Report should include recommendations for joint and penetration design details that will facilitate meeting the acceptance criteria for the final structure.

4.17 Packaging, Handling and Shipping Instructions

Submit any special packaging, handling or shipping instructions prior to shipping of any components. Any procedures necessary for safe handling of components should be noted in the instructions.

4.18 Material Safety Data Sheets

Supplier shall submit a list of hazardous chemicals and substances in accordance with the General Conditions.

4.19 Operation And Maintenance (O&M) Manuals

Submit operation and maintenance manuals for coiling door and motor. O&M manuals for manufacturer's standard items shall, unless otherwise specified, be the standard publication issued for the product by the manufacturer.

5. DESIGN

5.1 General Design Criteria

The structure shall be designed in accordance with recognized building code standards using methodology and loading combinations from the International Building Code (IBC). Loading combinations to be used in design are further clarified in Appendix F. Structural members shall not be designed in excess of their allowable stress limits (allowable stress design) for the design loads given below. Appropriate safety factors to yield and ultimate must be maintained.

5.2 Mockup Study

Prior to fabrication, a mockup study shall be conducted by the RCS Supplier. The mockup study shall include the required manufacturing and assembly of a structure representative of the final structure. Dimensions shall be 12 feet square x 8 feet high (nominal) and include at least one personnel door (with Lexan™ viewing window), at least one 4 ft x 8 ft Lexan™ observation window (with two integrated glove ports), and at least one 2 ft x 2 ft Lexan™ observation window. The confinement shall also include piping penetrations through reinforced panels that are representative of those to be placed in the final structure. Also, the mockup structure shall be caulked and taped at the joints in a manner that represents the method to be used in the final structure. Application of pressure and evaluation techniques for leakage of the mockup structure are the same as outlined in Section 1.3.2, Final Structure Testing, except that the quality assurance requirements per the specification are not applicable.

5.3 Dimensions and Layout

The RCS structure itself (excluding the transfer vestibule overburden, personnel access, and personnel monitoring areas) shall have the following nominal interior dimensions. See drawings in Appendix B for more detailed information.

Overall Width:	27 ft.
Overall Length:	52 ft
Overall Height:	24 ft

Dimensions of other areas are as shown on the drawings in Appendix B.

5.4 Seismic

Seismic loads shall be determined and applied in accordance with the IBC with parameters as follows: S_s period acceleration = 0.357g, 1-sec acceleration, S_1 = 0.131g, Site Class C, Seismic Importance Factor = 1.5 for structures and components, and Seismic Use Group III.

5.5 Roof Loads

At a minimum, the structure shall be capable of supporting a roof live load (construction/maintenance type loads) of 20 pounds per square foot applied to the framing, and any probable arrangement of loading resulting in the highest stress in the framing members. Framing members shall also be capable of supporting a minimum concentrated load of 250 lbs applied to the framing at any probable arrangement of loading resulting in the highest stress in a framing member.

5.6 Collateral Loads

The RCS shall be capable of supporting all additional dead loads, other than the weight of the building system, such as fire sprinklers, cameras, electrical conduit, mechanical HVAC systems, and electrical systems. Alternatively, a collateral load of 6 pounds per square foot shall be applied to the RCS walls and roof.

5.7 Internal Pressure Load

The assembled RCS confinement itself (excluding the transfer vestibule overburden, personnel access, and personnel monitoring areas) shall be designed to be structurally adequate to withstand a negative pressure of 4.0 inches, water column (abnormal event). The 4.0 inch negative internal pressure load is not required to be considered concurrently with seismic load combinations. The personnel access areas shall be designed to be structurally adequate to withstand a negative pressure of 1.0 inch, water column (operating condition). The transfer vestibule overburden and personnel monitoring areas shall be structurally adequate to withstand a negative pressure of 0.5 inch, water column (operating condition).

5.8 Additional Design Criteria

The modular panels shall be designed for rapid field erection. Panel interchange shall allow contiguous panels to be positioned horizontally and vertically in the same plane.

Doors into the RCS confinement itself (excluding the transfer vestibule overburden, personnel access, and personnel monitoring areas) will be specially designed to be air tight under a test pressure of 0.5 in, water column. A removable threshold will be required at the double door to facilitate subsequent removal of overburden through this opening. The threshold will then require replacement and the door re-sealed prior to waste removal operations.

Catwalk type planking layout with attached safety handrail shall be designed by the RCS Supplier. Arrangement shall be as contiguous as possible and accessible from an appropriate roof edge. Further, the layout must be such that each light fixture and camera can be safely maintained from the catwalk planking members. RCS Supplier shall provide planking, handrail, and all attachment hardware. Handrail design shall conform to CFR 1910 as applicable.

Anchorage studs with appropriate sealing washers and nuts shall be designed and provided by the RCS Supplier at appropriate locations for attachment of fire sprinkler piping on the interior of the RCS. See Appendix D for sizes and layout of fire sprinkler piping within the RCS. Positional tolerance of piping as shown in Appendix D shall be + or – 6 inches. Actual attachment hardware and installation of piping shall be by others.

Lighting and camera mounting brackets, attachment method, and attachment hardware shall be designed and provided by the RCS Supplier. Information required for the design of brackets is shown in Appendix E and on the drawings. Lighting fixtures are not required to be supplied by the RCS Supplier. Approximate locations of Life Safety equipment is also shown on the drawing in Appendix E. RCS Supplier shall ensure that framing members, as needed for attachment of this equipment, are provided in appropriate locations.

5.9 Special Inspection and Test Plan

As required by the IBC, the design of the seismic restraint system and its members or elements shall include a special inspection and test plan prepared by a registered design professional. The plan shall identify the following: 1) the designated systems or elements that are subject to the plan, 2) the special inspection and testing to be provided, including the applicable reference standards and codes, 3) the type and frequency of testing required, 4) type and frequency of special inspections required, 5) the structural observations to be performed during erection or assembly.

The design of the pressure resisting system and its members or elements (including, but not limited to, rivets, panels, doors and windows) shall also include a special inspection and test plan prepared by a registered design professional. The plan shall identify the same items as listed above, as applicable.

As a minimum, inspection and test plans shall include inspections as required by the IBC and by AWS D1.1

6. MANUFACTURING AND ASSEMBLY

6.1 General

All materials used in the structure shall be new, without defects, and free of repairs. Quantities of materials to be provided for erection and assembly shall be sufficient considering an appropriate waste factor. Modular panels shall be pre-assembled to the maximum extent possible prior to delivery on-site. BBWI will notify Supplier no less than one month prior to start of the second installation phase described in Section 1.2.3. Joint and penetration sealing materials (including silicone and joint sealing tape) shall be shipped to the project site two weeks prior to the second installation phase.

6.2 Materials

6.2.1 Stainless Steel Panels Including Sheet and Strip Material

ASTM A 167 or ASTM A 240, 300 series stainless steel, cold-rolled, annealed, and pickled with No. 2B finish on the outside surface. Inside surface is to receive a No. 4 finish. Stainless steel types 304L and 316L may be substituted for types 304 or 316. Thickness shall be 22 gauge, minimum.

6.2.2 Shapes and Bars for Frames and Structural Members

Shapes and bars shall be of ASTM A 36 structural quality carbon steel or ASTM A 992 steel shapes. Rolled steel plates, bars, and shapes shall be defined in ASTM A 6.

6.2.3 Personnel and Overburden Transfer Doors and Door Hardware

Doors for personnel access shall be pre-hung with the modular panel. Doors shall be one piece honeycomb construction fabricated from 20 gauge steel and 16 gauge cold rolled steel frame work (minimum). Doors to have viewing windows in accordance with Section 6.2.6. Doors to be finished as specified in section 6.3.2. Doors shall have integral thresholds unless otherwise specified herein or on the drawings. Provide simple pull and push plate egress hardware on all doors with the exception of doors leading to and from the RCS confinement itself (excludes the transfer vestibule overburden, personnel access, and personnel monitoring areas) which shall be provided with lock sets (lockable from exterior) as specified below. All door hardware shall conform to the requirements of NFPA 101.

Provide lock sets and cylinders compatible with Government-furnished and installed Medeco High Security Locks “KeyMark” 7-pin interchangeable cores and Medeco High Security cams.

6.2.4 Coiling Door

Painted carbon steel slats. Electric 120/208 volt, single phase or three phase. Do not supply 240 volt motor.

6.2.5 Windows and Portholes in Confinement Walls or Roof

Lexan™. MR-AC as manufactured by General Electric. Sizes and locations as indicated on the drawings.

6.2.6 Windows in Personnel Doors

Lexan™. MR-AC as manufactured by General Electric. Sizes and locations as indicated on the drawings

6.2.7 Joint Tape

Joint tape shall be flame-retardant polyethylene, 5 in wide minimum, gray in color with rubber based pressure sensitive adhesive. Adhesion to steel shall be 30 oz. per inch width, minimum.

6.2.8 Silicone Sealant

100% silicone sealant (white) for interior applications.

6.2.9 Sealing Gaskets

Gasketing material must be compatible with chlorinated solvents (such as flouroelastomer (Viton) or flourosilicone sponge rubber (closed cell). Notably, chloroprene (Neoprene) and synthetic rubber are not acceptable for use unless the gasket will be completely isolated from potential exposure to chlorinated solvents which may be present due to excavation operations within the RCS proper.

6.2.10 Panel Attachment Rivets

Rivets shall be 3/16" Stavex Lo-Profile Head rivets, as manufactured by Avdel Cherry Textron Inc.

6.2.11 Bolts, Nuts, Studs, and Washers for Attachments and Accessories

ASTM A 307, commercial grade. Standard bolts shall be regular hexagon head type. Nuts shall be plain hexagon type.

6.2.12 High Strength Bolts, Nuts, and Washers for Structural Framing Members

ASTM A 325, Type 1, commercial grade, including heavy hexagon structural bolts, heavy hexagon nuts, and hardened washers. High strength bolts shall exhibit grade marks and

and fasteners without headmarkings, or with headmarkings identified on the United States Department of Energy (DOE) Headmark List, are prohibited.

6.3 Fabrication

6.3.1 Welding

The Supplier shall establish and qualify Weld Procedure Specifications (WPS) for any off-site welding performed during this subcontract in accordance with the requirements of AWS B2.1, D1.1 or D1.6 as applicable. Off-site welding shall be performed by welders or operators qualified in accordance with AWS B2.1, D1.1 or D1.6 as applicable.

6.3.2 Painting

Carbon steel components shall be coated with the standard factory coating (Supplier's standard blue or green), to resist rusting and mild acidic or caustic washing. Fabricated structural steel elements, or any pre-finished components that have undergone welding or other processes that would compromise the original manufactures finish shall be finished as follows:

Exposed steel shall be prepared in accordance with Steel Structures Painting Council (SSPC) specification SP-3, Power Tool Cleaning to remove all loose rust, loose mill scale, or residual paint.

After surface preparation, the steel shall be washed with a liquid phosphate high-pressure spray system prior to application of the finish coating.

After washing, the steel shall be primed and finish painted with a single part urethane coating. Painting shall be done in accordance with the manufactures recommended application instruction.

6.3.3 Panels and Joints

Interior panel joints and seams must be able to be readily sealed subsequent to building assembly. Additionally, the application method of caulking and taping at joints must be such that a seal is not compromised upon application of a negative pressure of 4.0 inches, water column.

Each stainless steel sheet on a panel shall have the edges set back slightly from the edge of the steel frame. This will preclude the sheathing from exposing raised/sharp edges.

Each stainless steel sheet panel shall have a crossbuck crease. This crossbuck creasing feature will increase the rigidity of the sheet metal and reduce the possibility of an "oil canning" effect.

6.3.4 Fabrication Process Control

Shop travelers or other work controlling documents, drawings, and specifications will be controlled to ensure only approved documents are used during material procurement and fabrication of the RCS. The controls placed on the work document shall include specific identification of each document, date of release, and approval signature(s).

6.3.5 Material Traceability

The Supplier's material controls shall include identification to parts of the assembly, and traceability of materials to Certificates of Conformance.

7. QUALITY ASSURANCE

7.1 General

The RCS shall be designed, fabricated, erected, and tested per the requirements of this specification.

7.2 Nondestructive Examinations

The Supplier shall conform to the approved special inspection and test plan as outlined in Section 5.9, Special Inspection and Test Plan. As a minimum, nondestructive examination by the Supplier will consist of visual inspection of all "structural welds" as identified on the approved shop drawings. Visual inspection procedure and acceptance criteria shall conform to requirements of AWS D1.1.

7.3 Procurement Document Control

Supplier's procurement documents shall identify appropriate test, inspection, and acceptance criteria for determining acceptability of the item or service. Copies of all procurement documents and material certifications shall be made available for review by BBWI the representative.

7.4 Document Control

The Supplier shall control all changes made to shop travelers, drawings, inspection or welding procedures or other design/fabrication documents using revision controls.

7.5 Measuring and Test Equipment

The fabricator and inspection subcontractors must ensure that any measuring and test equipment (calipers, torque wrenches, flow meter, etc.) are calibrated if used to verify critical characteristics of the design or fabrication. For example, torque wrenches to torque high-

strength fasteners must be calibrated. Calibration records shall be available for inspection by the BBWI representative.

7.6 Inspection Status

The fabricator must maintain status of items awaiting inspection or testing. The statusing process will ensure that items that are awaiting inspection or testing are clearly identified on the items or in documents traceable to the item (for example: travelers). The inspection subcontractor must authorize removal of the status tags, if used.

7.7 Nonconforming Items/ Corrective Actions

Items that do not conform to specified design requirements shall be controlled to prevent inadvertent installation or use. Those items shall be identified and segregated in a designated hold area until dispositioned or disposed. Non-conformances will be documented and approved by the engineer-of-record and submitted to BBWI on Supplier Interface Document (Form 540.16).

The Supplier shall determine and document the cause of and the corrective action for the nonconformance(s). BBWI shall be notified of corrective actions taken to prevent recurrence.

7.8 Quality Assurance Records

The Supplier must protect all design, fabrication, testing, and material documentation from loss, deterioration, or damage prior to submittal to BBWI per the Vendor Data Schedule.

8. PACKAGING AND SHIPPING

8.1 Piece Marking and Identification

All individual parts or bundles of packages of identical parts are to be clearly marked for identification or otherwise identified by clear installation procedures. Bolts and fasteners shall be packaged according to type, size, and length. Loose nuts and washers shall be packaged according to size and type. The shipping documents shall include a shipping list showing the description, quantity, and piece mark of the various parts, components, and elements.

8.2 Packaging

Parts shall be packaged to protect from damage during transportation to the job site and during erection.

8.3 Material Delivery

The building system materials shall be delivered to the project site between the hours of 7 a.m. to 4 p.m Monday through Thursday. Unloading will be accomplished by a construction

contractor with union labor. Supplier shall include documentation that describes the recommended method of off-loading with all items in each shipment. Supplier shall also include any special off-loading devices (e.g. special slings) as recommended.

8.4 Handling

At no time shall materials be dropped, thrown, or dragged over the transport equipment or the ground. Materials shall be protected at all times from standing water. Supplier shall include instructions for proper storage.

Appendix A

Vendor Data Schedule

431.14
08/01/2001
Rev. 03

Vendor Data Schedule

Project Title OU 7-10 GLOVEBOX EXCAVATOR METHOD PROJECT RETRIEVAL CONFINEMENT STRUCTURE

Purchase Order/ Work Order/ Subcontract No. 021052

System Engineer/ Project Manager JENSEN SCOTT A **Date:** 02-APR-02 **Rev:** 1

Vendor Data Coordinator Address POOLE M ANNETTE, TSB-1WH201, MS: 3930

Vendor Data Codes

A. As-Built Drawings B. Assembly Drawings C. Attendance Record D. Blasting Plan E. Catalog Data F. Chem & Physical Analysis G. Concrete Mix Design H. Control System Diagram I. Design Calculations J. Installation Instructions	K. Manufacturers Data Report L. O&M Manual M. Parts List N. Piping Drawing O. Procedure/Instructions P. Pump Head Curves Q. Personnel Qualifications R. Red_line Drawings S. RSMI & Maintenance Log T. Sample(Color, Texture, etc.)	U. Shop Drawings V. Survey Records W. Test Procedure X. Special Processes Y. Operational/CC Testing Z. Test Reports AA. UL/FM Listing AB. Warranty/Guarantee AC. Weld Records AD. Wiring Diagrams	AE. MSDS AF. Hardware Schedule AG. Specification AH. Manufacturing/Inspection/Test Plan AI. Test Certification AJ. Recommended Spares AK. Special Tools List AL. Certificate of Conformance AM. Certificate of Disposal or Destruction AN. Design Verification	AO. Design Qualification Testing AP. Traceability Procedure AQ. Cleaning Procedure AR. Weld Procedure Qualificaiton AS. Welder Performance Personnel Qualifications AT. Non-Destructive Examination Personnel Certifications AU. Inspector Certifications AV. Limited Shelf Life/Operational Data AW. Special Packaging, Shipping, and Rigging Procedure AX. Certificate of Materials to ASME Code AY. Chemical Inventory AZ. Other

When to Submit

AC - As Completed AT - After Test BC - Before Contract Awarded	BFA - Before Final Acceptance BFR - Before Fabrication Release ROS - Removed Off-Site PDS - Prior to Delivery on site	PTP - Prior to Purchase PS - Prior to Shipment PT - Prior to Test	PTC - Prior to Construction Start PTI - Prior to Installation PTW - Prior to Welding	TS - Time of Shipment WP - With Proposal

Item No.	Clause/Article or Drawing/Specification Reference	Description	Vendor Data Code	Extra Copies Required	When to Submit	Approval Code
1	Section 4.2	Qualifications	Q. Personnel Qualifications	0	BC - Before Contract Awarded	Approval Required
2	Section 4.3	Design calculations	I. Design Calculations	0	BFR - Before Fabrication Release	Approval Required
3	Section 4.4	Letter of certification of peer review of design calculations	AN. Design Verification	0	BFR - Before Fabrication Release	Approval Required
4	Section 4.5	Shop drawings	U. Shop Drawings	1	BFR - Before Fabrication Release	Approval Required
5	Section 4.6	Erection drawings	B. Assembly Drawings	1	PS - Prior to	Approval

					Shipment	Required
6	Section 4.7	Erection instructions or procedures	J. Installation Instructions	0	PS - Prior to Shipment	Approval Required
7	Section 4.8	Welder qualifications	AS. Welder Performance Personnel Qualifications	0	PTW - Prior to Welding	Approval Required
8	Section 4.9	Weld procedures	AR. Weld Procedure Qualificaiton	0	PTW - Prior to Welding	Approval Required
9	Section 4.10	Non-destructive examination procedures	W. Test Procedure	0	PT - Prior to Test	Approval Required
10	Section 4.11	Inspector qualifications	AT. Non-Destructive Examination Personnel Certifications	0	PT - Prior to Test	Approval Required
11	Section 4.12	Certification of conformance	AL. Certificate of Conformance	0	PTI - Prior to Installation	Approval Required
12	Section 4.13	Spares and replacements parts list	AJ. Recommended Spares	0	PS - Prior to Shipment	Approval Required
13	Section 4.14	Manufacturing and inspection/test plan	AH. Manufacturing/Inspection/Test Plan	0	BFR - Before Fabrication Release	Approval Required
14	Section 4.15	Inspection Report	Z. Test Reports	0	PDS - Prior to Delivery on site	Approval Required
15	Section 4.16	Mockup Study Report	AZ. Other	0	BFR - Before Fabrication Release	Approval Required
16	Section 4.17	Packaging, handling and shipping instructions	AW. Special Packaging, Shipping, and Rigging Procedure	0	PS - Prior to Shipment	Approval Required
17	Section 4.18	Material Safety Data Sheets	AE. MSDS	0	PDS - Prior to Delivery on site	Approval Required
18	Section 4.19	Overhead door operational and maintenance manual	L. O&M Manual	0	TS - Time of Shipment	Information Only

Instructions:

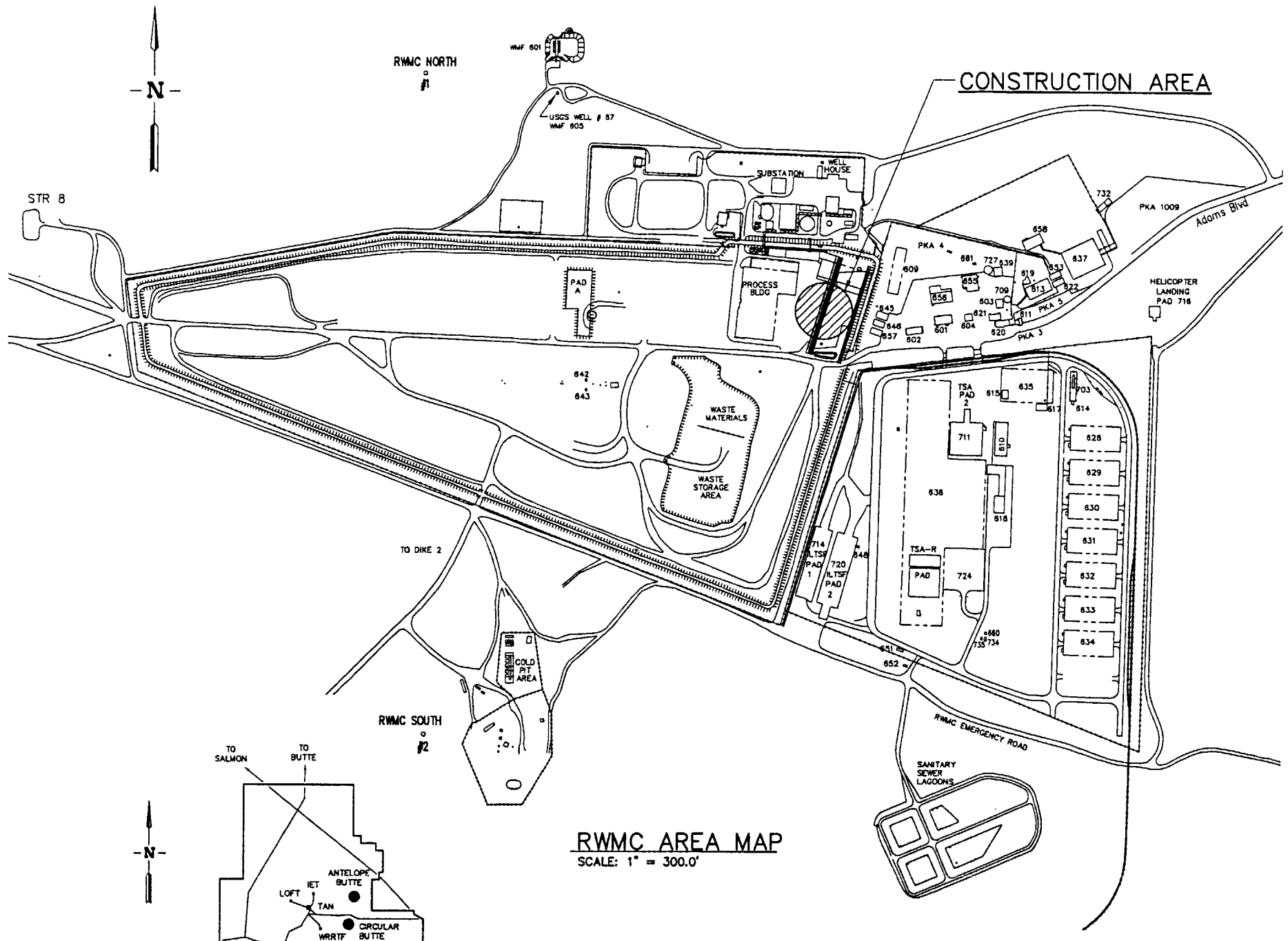
1. Refer to subcontract documents for instructions on submittals.
2. Electronic submittals in lieu of paper documents are acceptable and encouraged.
3. The normal number of copies required is ONE. If more are required, the number will be shown here.
4. THE INEEL WILL SCAN ALL SUBMITTED VENDOR DATA INTO A SYSTEM THAT IS ACCESSIBLE TO ALL INEEL EMPLOYEES UNLESS THE SUPPLIER/SUBCONTRACTOR IDENTIFIES SUBMITTED INFORMATION AS PROPRIETARY.

Appendix B

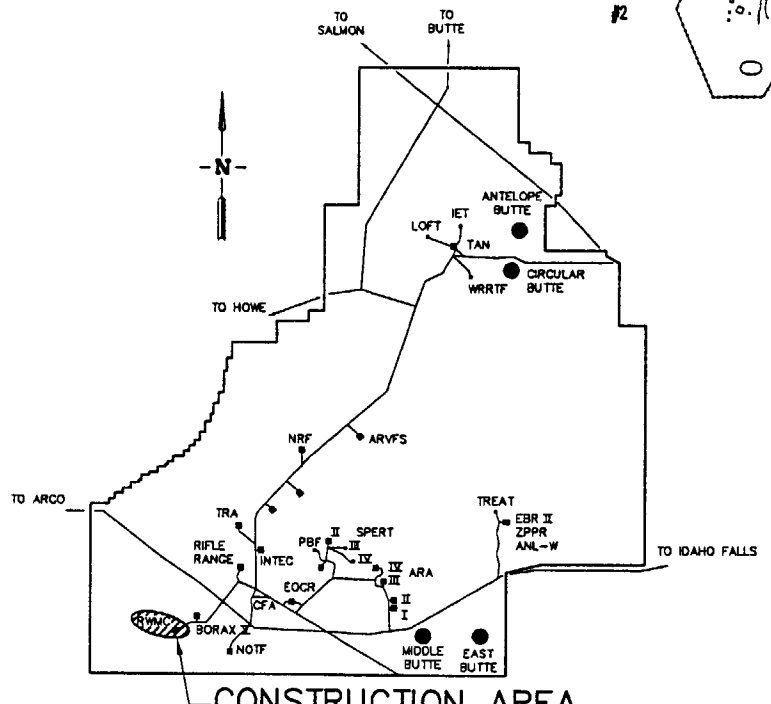
Drawings

FMT-01-REV 3.1

REVISIONS		
REV	DESCRIPTION	EFFECTIVE DATE:



RWMC AREA MAP
SCALE: 1" = 300.0'



SITE MAP
SCALE: NONE

DRAWING INDEX

PAGE NO.	DWG NO.	A-E SH NO.	REV	DRAWING TITLE
TITLE SHEET				
1	519888	T-1		SITE MAP, AREA MAP AND DRAWING INDEX
ARCHITECTURAL				
2	519889	A-1		FLOOR PLAN AND LEGENDS
3	519890	A-2		ELEVATIONS
4	519891	A-3		VIEWS
5	519892	A-4		VIEWS
6	519893	A-5		VIEWS
7	519894	A-6		ROOF PLAN, DETAILS AND LEGEND
8	519895	A-7		GLOVE BOX CONNECTION SECTION AND DETAILS

X-REFERENCE DRAWINGS

519671	RCS STRUCTURE

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REVISION: 0
ORIGINAL SIGNED BY: SCOTT ALAN JENSEN
DATE ORIGINAL SIGNED: 4/9/02
SEAL NUMBER: 4003
ORIGINAL STORED AT: EROB DOCUMENT CONTROL

REGISTERED PROFESSIONAL ENGINEER 4003 STATE OF IDAHO SCOTT ALAN JENSEN

FOR DRAWING INDEX SEE DRAWING NO.	519888
SUBCONTRACT NO.	N/A
REQUESTER: SA DAVIES	
DESIGN: S. JENSEN	
DRAWN: B.SEARLE	
PROJECT NO.	021052
SPEC CODE	REC REL
FOR REVIEW/APPROVAL SIGNATURES SEE DAR NO. 90072	
DESIGN PHASE: PERF SPEC	
SAFETY CATEGORY: SS	
EFFECTIVE DATE: 4/9/02	
SCALE: NOTED	

300' 200' 100' 0 300'
SCALE: 1" = 300.0'

INEEL — Idaho National Engineering & Environmental Laboratory, BECHTEL BWXT IDAHO, LLC

OU 7-10
GLOVEBOX EXCAVATOR METHOD PROJECT
RETRIEVAL CONFINEMENT STRUCTURE

SITE MAP, AREA MAP AND DRAWING INDEX

SIZE	CAGE CODE	INDEX CODE NUMBER				DWG-	REV
		AREA	TYPE	CI	ORG		
D	1MF3	098	0100	01	090	519888	

SHEET T-1

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REVISIONS		
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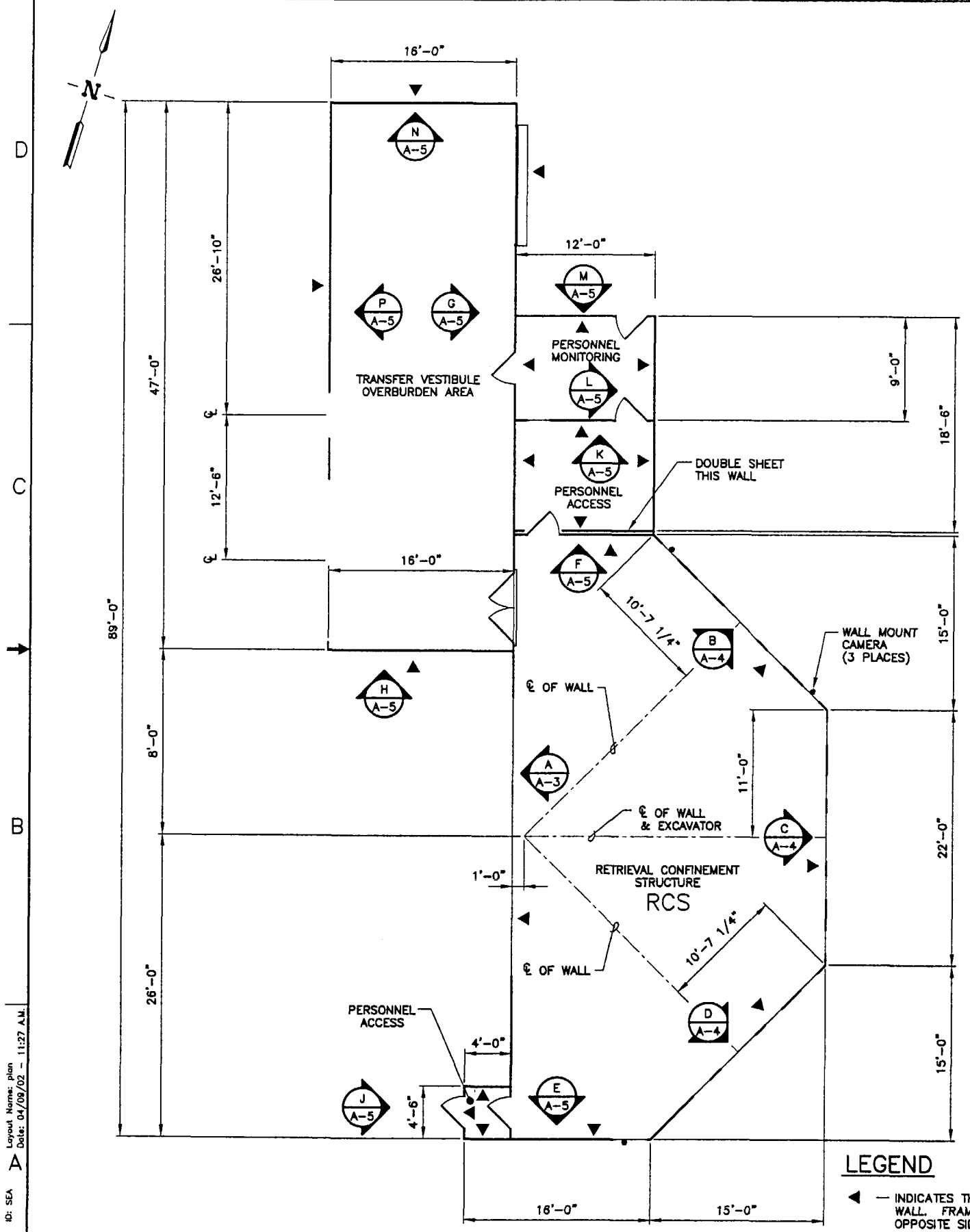

PLAN
SCALE: 3/16"=1'-0"

LEGEND
◀ — INDICATES THE SMOOTH SIDE OF PANEL WALL. FRAMING MEMBERS FOR WALL ON OPPOSITE SIDE OF INDICATOR.

OPENING LEGEND

TYPE	NOMINAL SIZE	QUANTITY	TYPE OF OPENING	GLAZING	POSITIONAL TOLERANCES	REMARKS
A	8'-0" X 4'-0"	5	WINDOW OPENING	LEXAN	HORIZ: ±3", VERT: +6	OBSERVATION
B	30" DIAMETER	1	FRAMED OPENING	NONE	HORIZ: ±6", VERT: ±6"	AIR INLET – 1 1/2" MIN. FLANGE REQ'D
C	12" DIAMETER	1	FRAMED OPENING	NONE	HORIZ: ±6", VERT: ±6"	AIR INLET
D	2'-0" X 2'-0"	2	FRAMED OPENING	NONE	HORIZ: ±6", VERT: –6"	AIR INLET
E	4'-2 3/4" X 4'-2 3/4"	3	FRAMED OPENING	NONE	HORIZ: ±1", VERT: ±1"	OPENING FOR GLOVE BOX
F	2'-0" X 2'-0"	11	WINDOW OPENING	LEXAN	HORIZ: ±2", VERT: ±2"	OBSERVATION
G	2'-0" X 2'-0"	3	WINDOW OPENING	LEXAN	HORIZ: ±2", VERT: ±2"	CAMERA
H	1'-6" X 7'-6"	1	FRAMED OPENING	NONE	HORIZ: +3", VERT: ±3"	HEPA INLET – 1 1/2" MIN. FLANGE REQ'D
J	6'-0" X 4'-7"	1	FRAMED OPENING	NONE	HORIZ: ±1", VERT: ±1"	OPENING FOR EXCAVATOR
K	8" DIAMETER	1	SEE NOTE 3	NONE	HORIZ: ±6", VERT: –3"	OPENING FOR GROUT AT LATER PHASE
L	4" DIAMETER	2	SEE NOTE 3	NONE	HORIZ: ±6", VERT: –3"	OPENING FOR AIR SAMPLING PORT
M	14" X 14"	1	FRAMED OPENING	NONE	HORIZ: ±6", VERT: ±6"	OPENING FOR FAN
N	2" X 3"	1	SEE NOTE 3	NONE	HORIZ: ±6", VERT: –6"	OPENING FOR BREATHING AIR
P	4" DIAMETER	1	SEE NOTE 3	NONE	HORIZ: ±6"	OPENING AT ROOF

DOOR OPENING LEGEND

TYPE	NOMINAL SIZE	QUANTITY	NOMINAL SIZE OF GLAZING	TYPE OF GLAZING	TYPE OF OPENING	REMARKS
1	3'–0" X 7'–0"	6	2'–0" X 2'–0"	LEXAN	DOOR OPENING	
2	6'–0" X 7'–0"	1	2'–0" X 2'–0"	LEXAN	DOOR OPENING	GLAZING IN EACH DOOR
3	10'–0" X 10'–0"	1	———	———	COILING DOOR OPENING	
4	4'–0" X 8'–0"	1	———	———	DOOR OPENING	NO DOOR REQUIRED – FRAMED OPENING ONLY
5	14'–0" X 12'–0"	1	———	———	DOOR OPENING	NO DOOR REQUIRED – FRAMED OPENING ONLY

NOTES

1. PLAN DIMENSIONS ARE FROM INSIDE OF WALL TO INSIDE OF WALL (NOMINAL) OR FROM INSIDE OF WALL TO CENTER LINE (NOMINAL).
2. SEE SHEETS A–3, A–4 & A–5 FOR WALL DIMENSIONS.
3. PENETRATION TO BE FIELD CUT BY OTHERS.
4. RETRIEVAL CONFINEMENT STRUCTURE BEARS ON 1/2" MINIMUM CARBON STEEL PLATE SUPPORTED BY CARBON STEEL WIDE FLANGE BEAMS.

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X–REF DRAWING
519671.dwg

REVISION: 0
ORIGINAL SIGNED BY: SCOTT ALAN JENSEN
DATE ORIGINAL SIGNED: 4/9/02
SEAL NUMBER: 4003
ORIGINAL STORED AT: EROB DOCUMENT CONTROL

REGISTERED PROFESSIONAL ENGINEER 4003 STATE OF IDAHO SCOTT ALAN JENSEN

FOR DRAWING INDEX SEE DRAWING NO. 519888	SUBCONTRACT NO. N/A	INEEL Idaho National Engineering & Environmental Laboratory BECHTEL BWXT IDAHO, LLC
SCALE: 3/16" = 1'-0"	REQUESTER: S.A. DAVIES	OU 7–10 GLOVEBOX EXCAVATOR METHOD PROJECT RETRIEVAL CONFINEMENT STRUCTURE
	DESIGN: S. JENSEN	FLOOR PLAN AND LEGENDS
	DRAWN: B.SEARLE	
	PROJECT NO. 021052	
	SPEC CODE REC REL	
DESIGN PHASE: PERF SPEC	FOR REVIEW/APPROVAL SIGNATURES SEE DAR NO. 90072	SIZE D | CAGE CODE 01MF3 | INDEX CODE NUMBER AREA 098 TYPE 0671 CI 00 ORG 090 | DWG-519889 | REV
SAFETY CATEGORY: SS	EFFECTIVE DATE: 4/9/02	SCALE: NOTED | SHEET A–1

Plan: 519889.dwg
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Layout Name: plan
Date: 04/09/02 – 11:27 A.M.

PWT-01-REV 3.3

REVISIONS		
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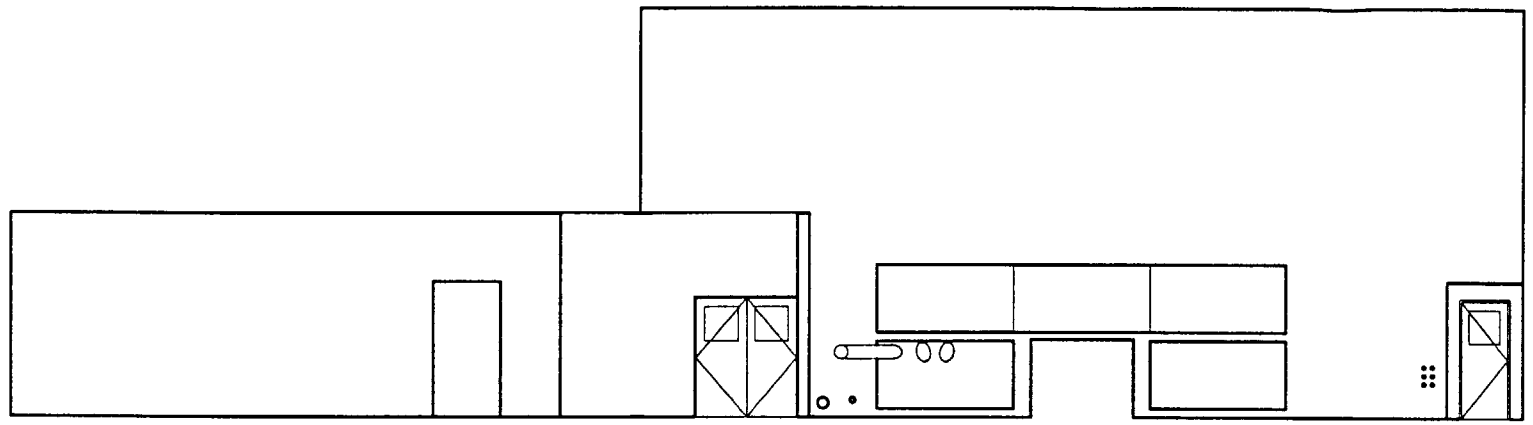
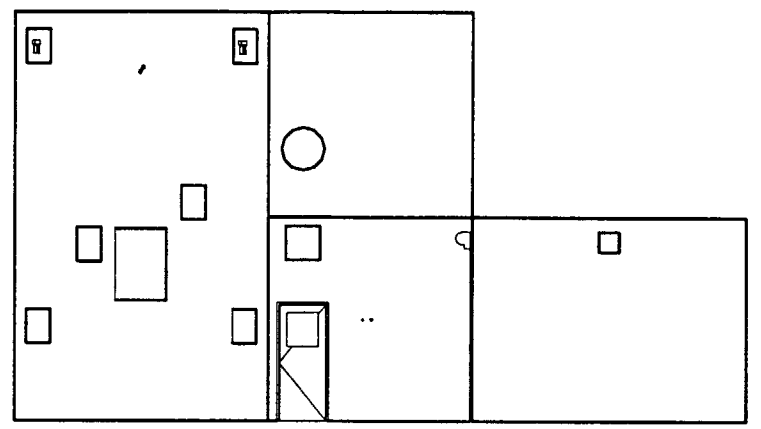
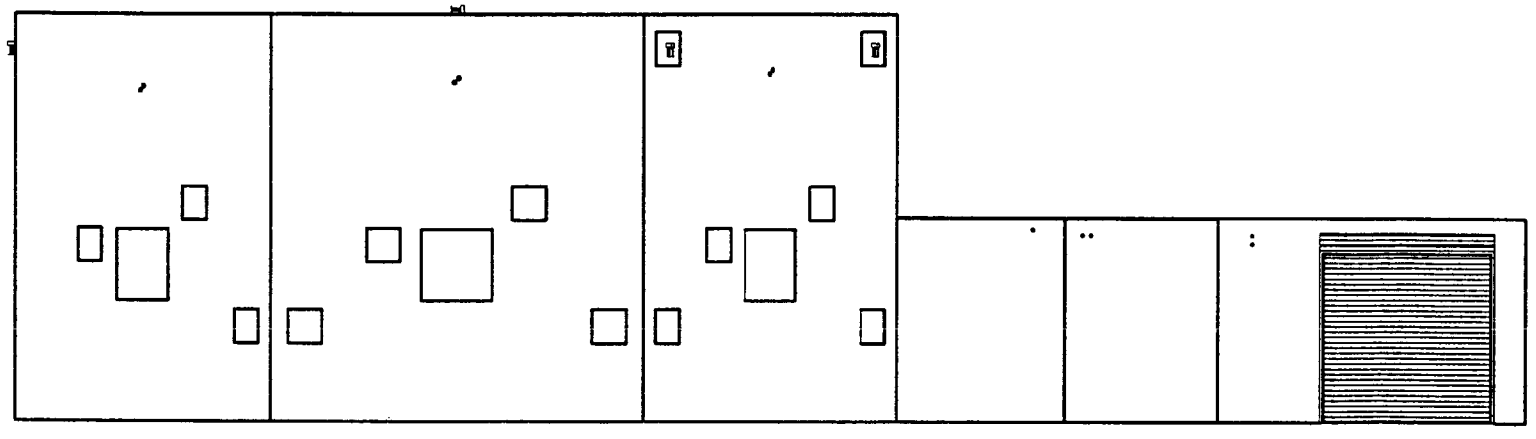


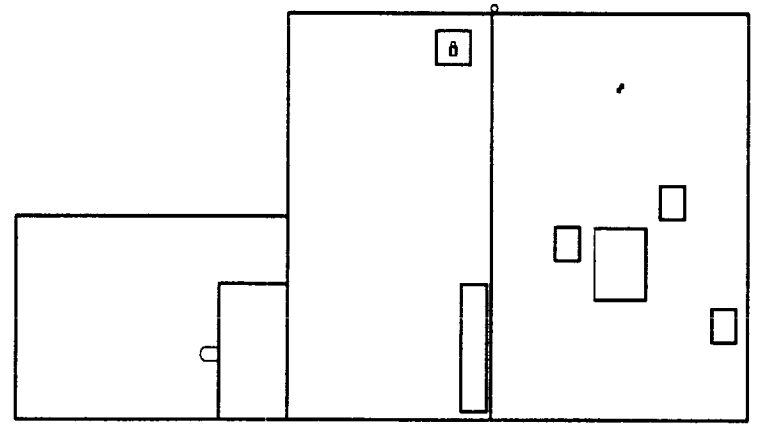
WEST ELEVATION



NORTH ELEVATION



EAST ELEVATION



SOUTH ELEVATION

NOTES

1. SEE VIEWS ON SHEETS A-3, A-4 AND A-5 FOR DIMENSIONS.

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REVISION: 0
ORIGINAL SIGNED BY: SCOTT ALAN JENSEN
DATE ORIGINAL SIGNED: 4/9/02
SEAL NUMBER: 4003
ORIGINAL STORED AT: EROB DOCUMENT CONTROL

REGISTERED PROFESSIONAL ENGINEER 4003 STATE OF IDAHO SCOTT ALAN JENSEN

X-REF DRAWING
519671.dwg

FOR DRAWING INDEX SEE DRAWING NO. 519888	SUBCONTRACT NO. N/A
SCALE: 3/16" = 1'-0"	REQUESTER: S.A. DAVIES
	DESIGN: S. JENSEN
	DRAWN: B.SEARLE
	PROJECT NO. 021052
	SPEC CODE REC REL
DESIGN PHASE: PERF SPEC	FOR REVIEW/APPROVAL SIGNATURES SEE DAR NO. 90072
SAFETY CATEGORY: SS	EFFECTIVE DATE: 4/9/02

INEEL (Idaho National Engineering & Environmental Laboratory) BECHTEL BWXT IDAHO, LLC

OU 7-10
GLOVEBOX EXCAVATOR METHOD PROJECT
RETRIEVAL CONFINEMENT STRUCTURE

ELEVATIONS

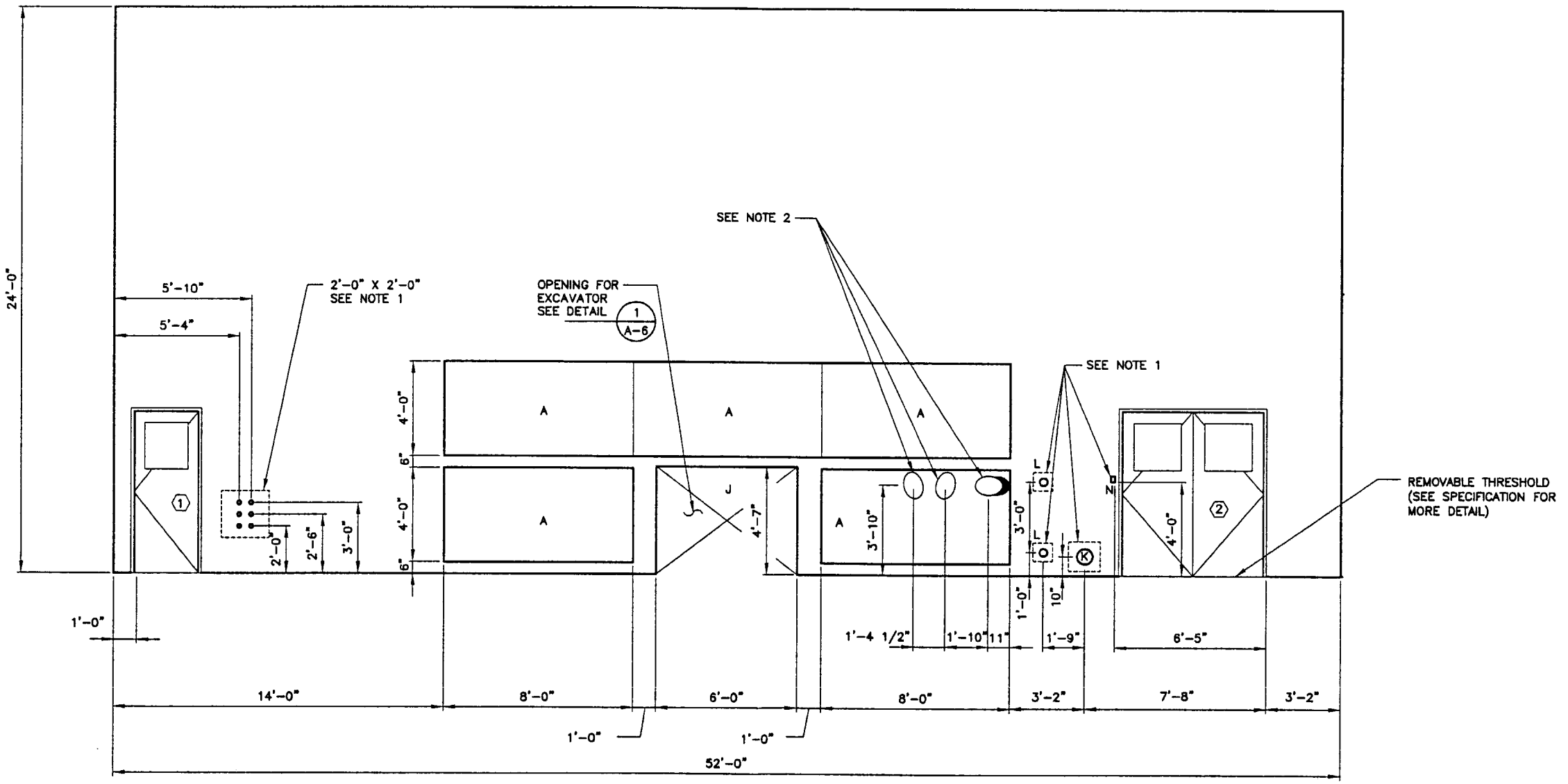
SIZE	CAGE CODE	INDEX CODE NUMBER AREA	TYPE	CI	ORG	DWG-519890	REV
D	01MF3	098	0671	00	090		

SCALE: NOTED SHEET A-2

File: 519890.dwg
Path: Y:\struct
ID: SEA
Layout Name: elev
Date: 04/09/02 - 11:27 A.M.

FMT-01-REV 2.3

REVISIONS		
REV	DESCRIPTION	EFFECTIVE DATE:



VIEW
SCALE: 3/8"=1'-0" (A-1)

NOTES

1. REINFORCE THIS AREA FOR PENETRATIONS, (MIN. 16 GA PANEL MATERIAL). SEE SPECIFICATION FOR EXACT PENETRATION SIZES. PROVIDE ADEQUATE FRAMING SUPPORT. PENETRATIONS TO BE FIELD CUT BY OTHERS.
2. ANTICIPATED LOCATIONS FOR GLOVE PORTS (QUANTITY : 2) AND BAG OUT OPENING (QUANTITY : 1). OPENING TO BE CUT IN FIELD BY OTHERS.
3. DIMENSIONS ARE FROM INSIDE OF CLEAR OPENING TO INSIDE OF WALL (NOMINAL), OR FROM CENTERLINE TO FINISH FLOOR LEVEL (NOMINAL), OR FROM INSIDE OF CLEAR OPENING TO FINISH FLOOR LEVEL (NOMINAL).

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REVISION: 0
ORIGINAL SIGNED BY: SCOTT ALAN JENSEN
DATE ORIGINAL SIGNED: 4/9/02
SEAL NUMBER: 4003
ORIGINAL STORED AT: EROB DOCUMENT CONTROL

REGISTERED PROFESSIONAL ENGINEER 4003 STATE OF IDAHO SCOTT ALAN JENSEN

X-REF DRAWING
519671.dwg

FOR DRAWING INDEX SEE DRAWING NO. 519888	SUBCONTRACT NO. N/A
SCALE: 3/8" = 1'-0"	REQUESTER: S.A. DAVIES
	DESIGN: S. JENSEN
	DRAWN: B.SEARLE
	PROJECT NO. 021052
	SPEC CODE REC REL
DESIGN PHASE: PERF SPEC	FOR REVIEW/APPROVAL SIGNATURES SEE DAR NO. 90072
SAFETY CATEGORY: SS	EFFECTIVE DATE: 4/9/02

INEEL — Idaho National Engineering & Environmental Laboratory, BECHTEL BWXT IDAHO, LLC

OU 7-10
GLOVEBOX EXCAVATOR METHOD PROJECT
RETRIEVAL CONFINEMENT STRUCTURE
VIEWS

SIZE	CAGE CODE	INDEX CODE NUMBER AREA	TYPE	CI	ORG	DWG-519891	REV
D	01MF3	098	0671	00	090		

SCALE: NOTED — SHEET A-3

File: 519891.dwg Layout Name: A-3
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REVISIONS		
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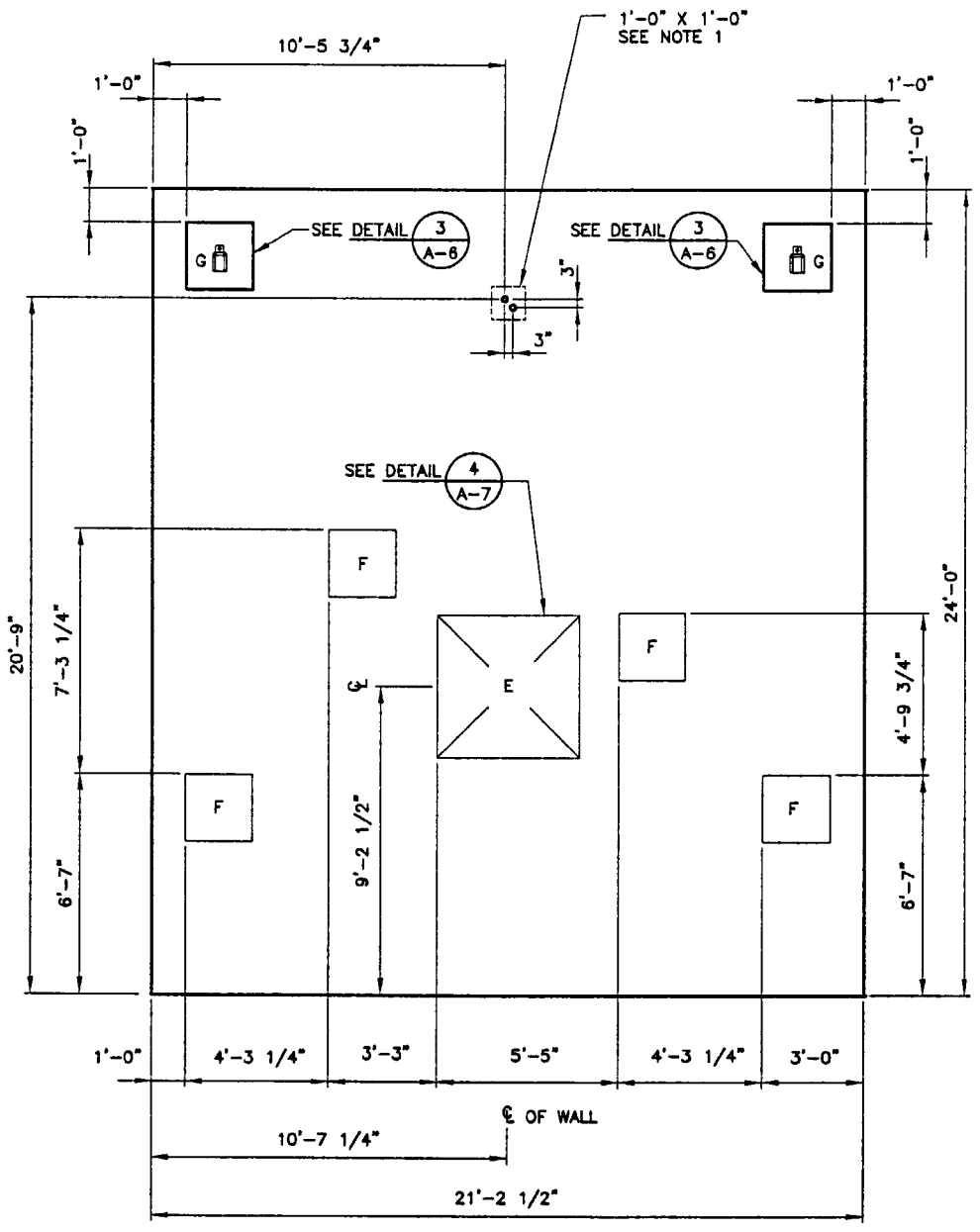
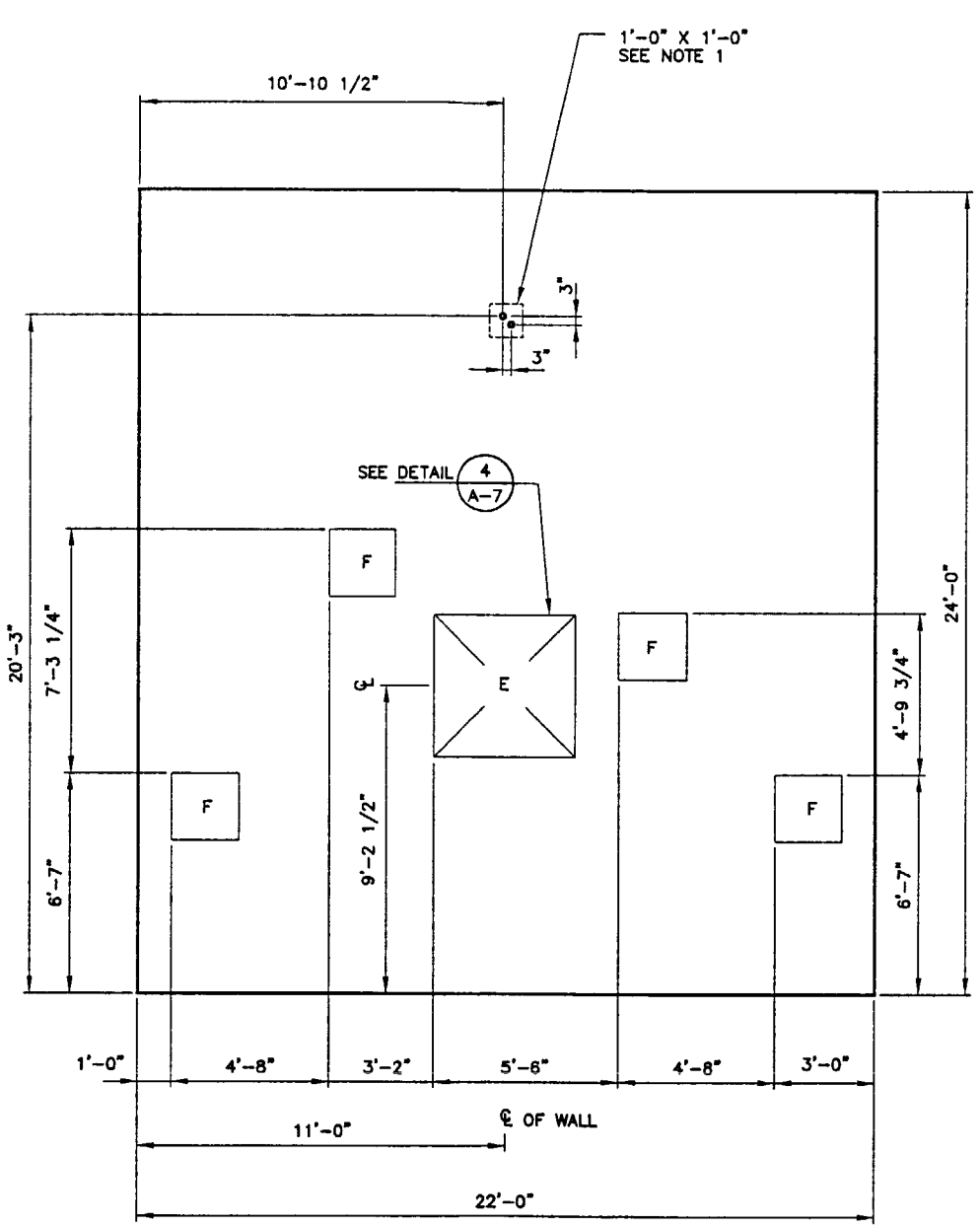
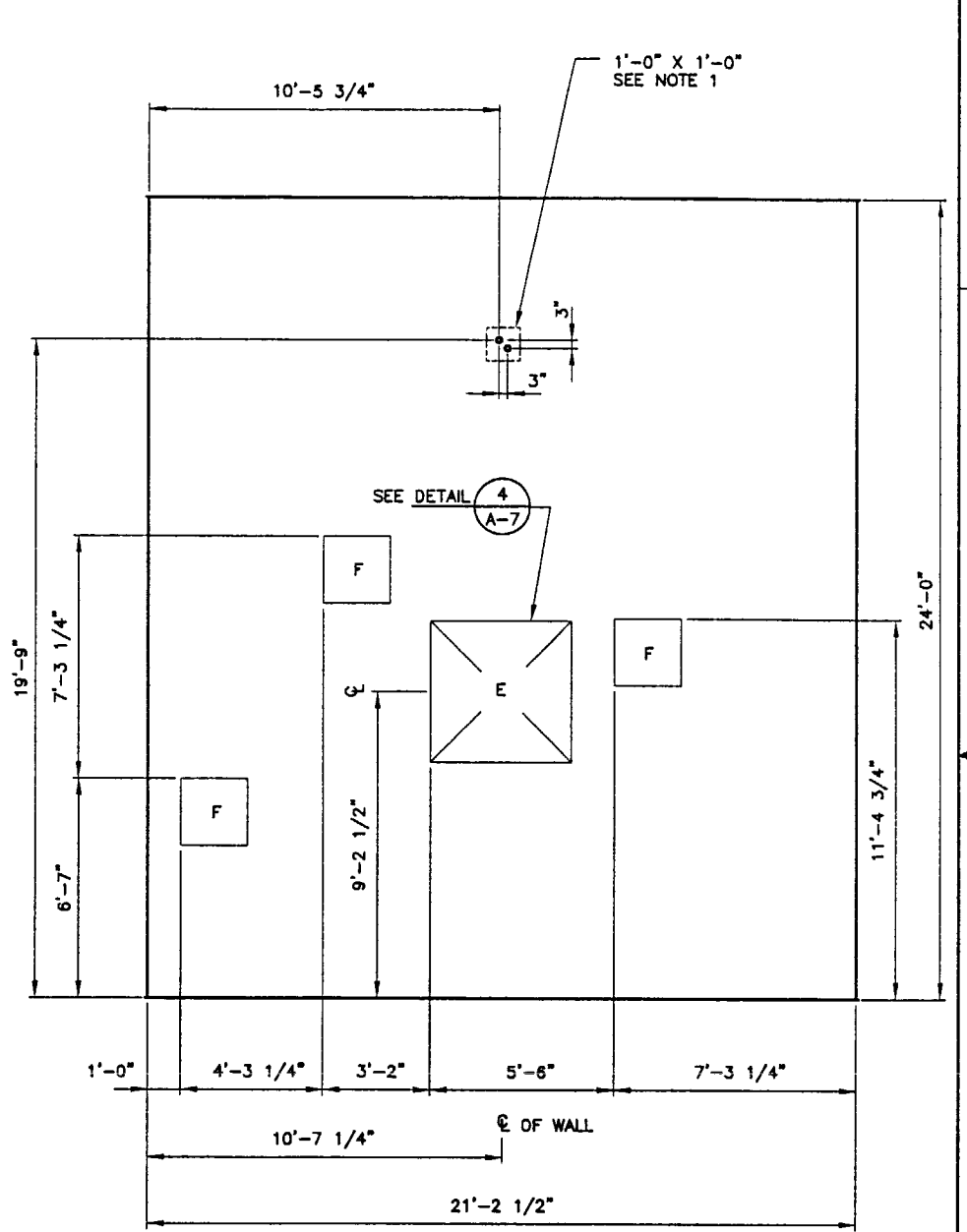


VIEW
SCALE: 3/8"=1'-0" (B / A-1)



VIEW
SCALE: 3/8"=1'-0" (C / A-1)



VIEW
SCALE: 3/8"=1'-0" (D / A-1)

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DO NOT FABRICATE

X-REF DRAWING
519671.dwg

NOTES

1. REINFORCE THIS AREA FOR PENETRATIONS, (MIN. 16 GA PANEL MATERIAL), SEE SPECIFICATION FOR EXACT PENETRATION SIZES. PROVIDE ADEQUATE FRAMING SUPPORT. PENETRATIONS TO BE FIELD CUT BY OTHERS.
2. DIMENSIONS ARE FROM INSIDE OF CLEAR OPENING TO INSIDE OF WALL (NOMINAL), OR FROM CENTERLINE TO FINISH FLOOR LEVEL (NOMINAL), OR FROM INSIDE OF CLEAR OPENING TO FINISH FLOOR LEVEL (NOMINAL).

REVISION: 0
ORIGINAL SIGNED BY: SCOTT ALAN JENSEN
DATE ORIGINAL SIGNED: 4/9/02
SEAL NUMBER: 4003
ORIGINAL STORED AT: EROB DOCUMENT CONTROL

REGISTERED PROFESSIONAL ENGINEER 4003 STATE OF IDAHO SCOTT ALAN JENSEN

FOR DRAWING INDEX SEE DRAWING NO. 519888	SUBCONTRACT NO. N/A
SCALE: 3/8" = 1'-0"	REQUESTER: S.A. DAVIES
	DESIGN: S. JENSEN
	DRAWN: B.SEARLE
	PROJECT NO. 021052
	SPEC CODE REC REL
DESIGN PHASE: PERF SPEC	FOR REVIEW/APPROVAL SIGNATURES SEE DAR NO. 90072
SAFETY CATEGORY: SS	EFFECTIVE DATE: 4/9/02

INEEL — Idaho National Engineering & Environmental Laboratory — BECHTEL BWXT IDAHO, LLC

OU 7-10
GLOVEBOX EXCAVATOR METHOD PROJECT
RETRIEVAL CONFINEMENT STRUCTURE

VIEWS

SIZE	CAGE CODE	INDEX CODE NUMBER AREA	TYPE	SL	ORG	DWG-519892	REV
D	01MF3	098	0671	00	090		

SCALE: NOTED — SHEET A-4

File: 519892.dwg
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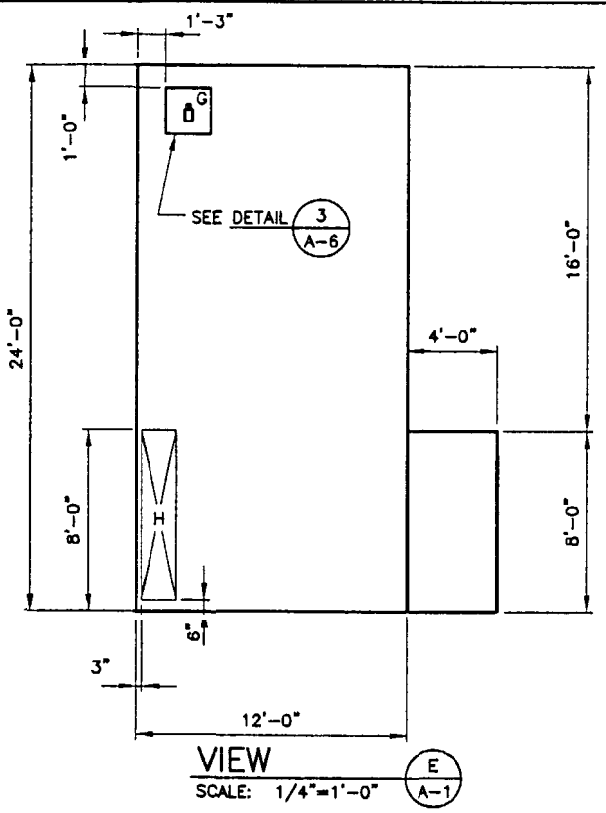
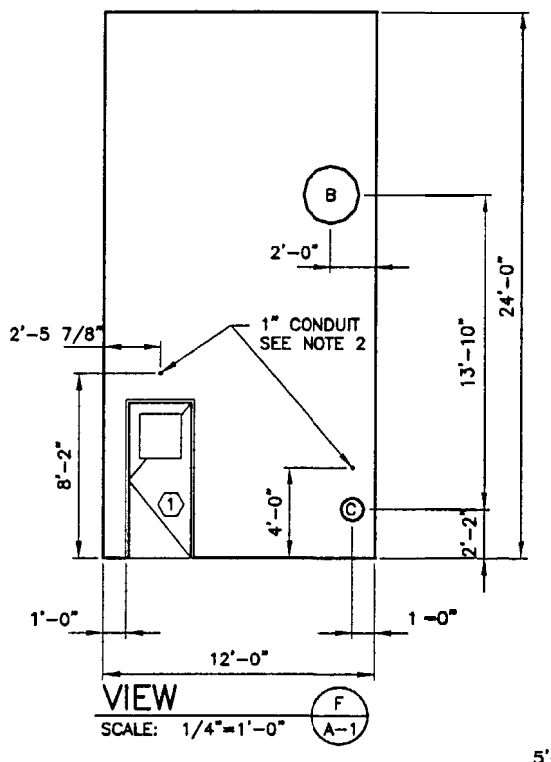
Layout Name: A-4
Date: 04/09/02 - 11:27 A.M.

REVISIONS		
REV	DESCRIPTION	EFFECTIVE DATE:



VIEW
SCALE: 1/4"=1'-0" E A-1



VIEW
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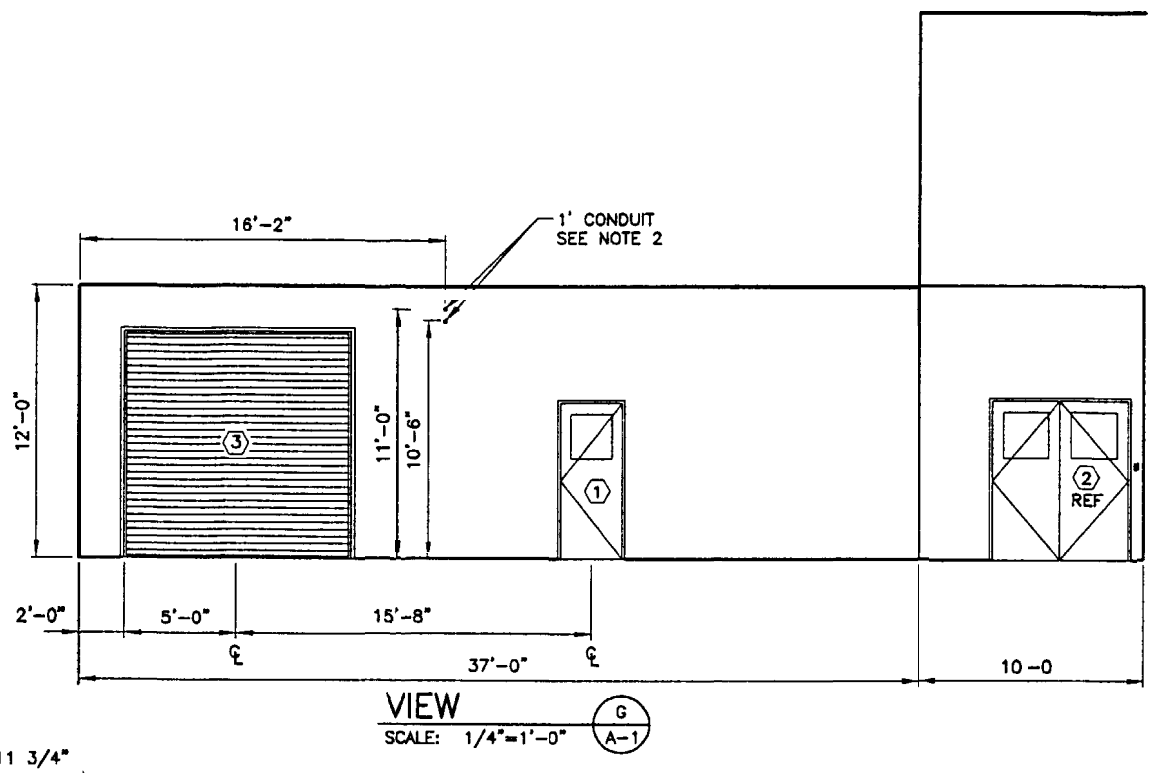
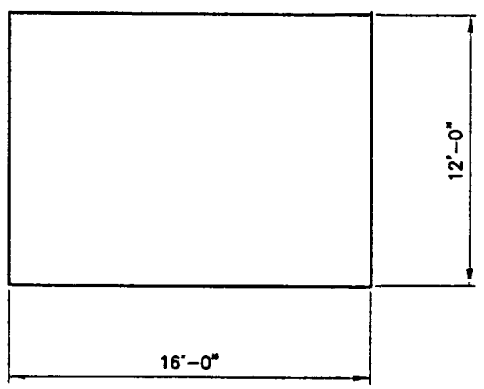


VIEW
SCALE: 1/4"=1'-0" G A-1



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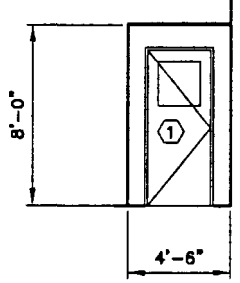

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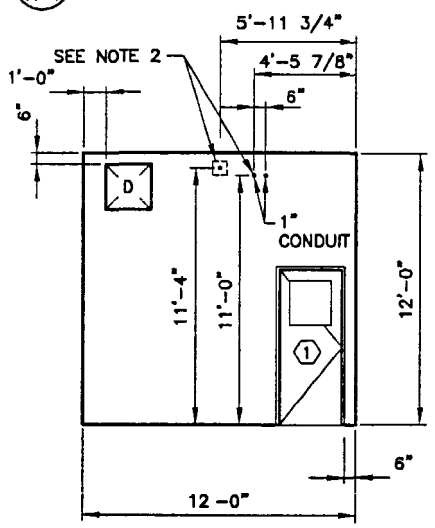

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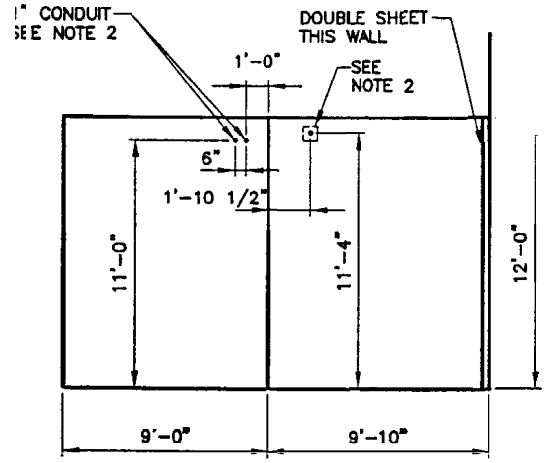

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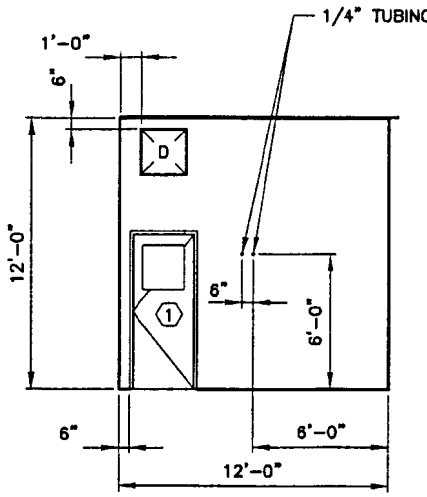

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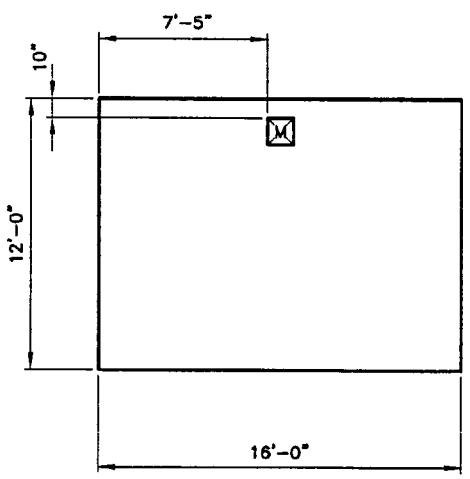

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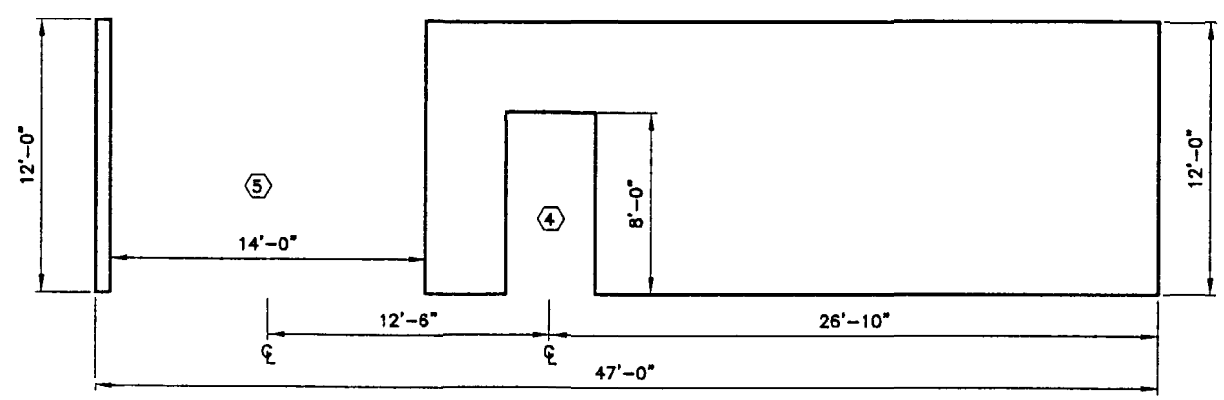

VIEW
SCALE: 1/4"=1'-0" P A-1

NOTES

1. DIMENSIONS ARE FROM INSIDE OF CLEAR OPENING TO INSIDE OF WALL (NOMINAL), OR FROM CENTERLINE TO FINISH FLOOR LEVEL (NOMINAL), OR FROM INSIDE OF CLEAR OPENING TO FINISH FLOOR LEVEL (NOMINAL).
2. REINFORCE THIS AREA FOR PENETRATIONS, (MIN. 16 GA PANEL MATERIAL), SEE SPECIFICATION FOR EXACT PENETRATION SIZES. PROVIDE ADEQUATE FRAMING SUPPORT. PENETRATIONS TO BE FIELD CUT BY OTHERS.

X-REF DRAWING
519671.dwg

REVISION: 0
ORIGINAL SIGNED BY: SCOTT ALAN JENSEN
DATE ORIGINAL SIGNED: 4/9/02
SEAL NUMBER: 4003
ORIGINAL STORED AT: EROB DOCUMENT CONTROL

REGISTERED PROFESSIONAL ENGINEER 4003 STATE OF IDAHO SCOTT ALAN JENSEN

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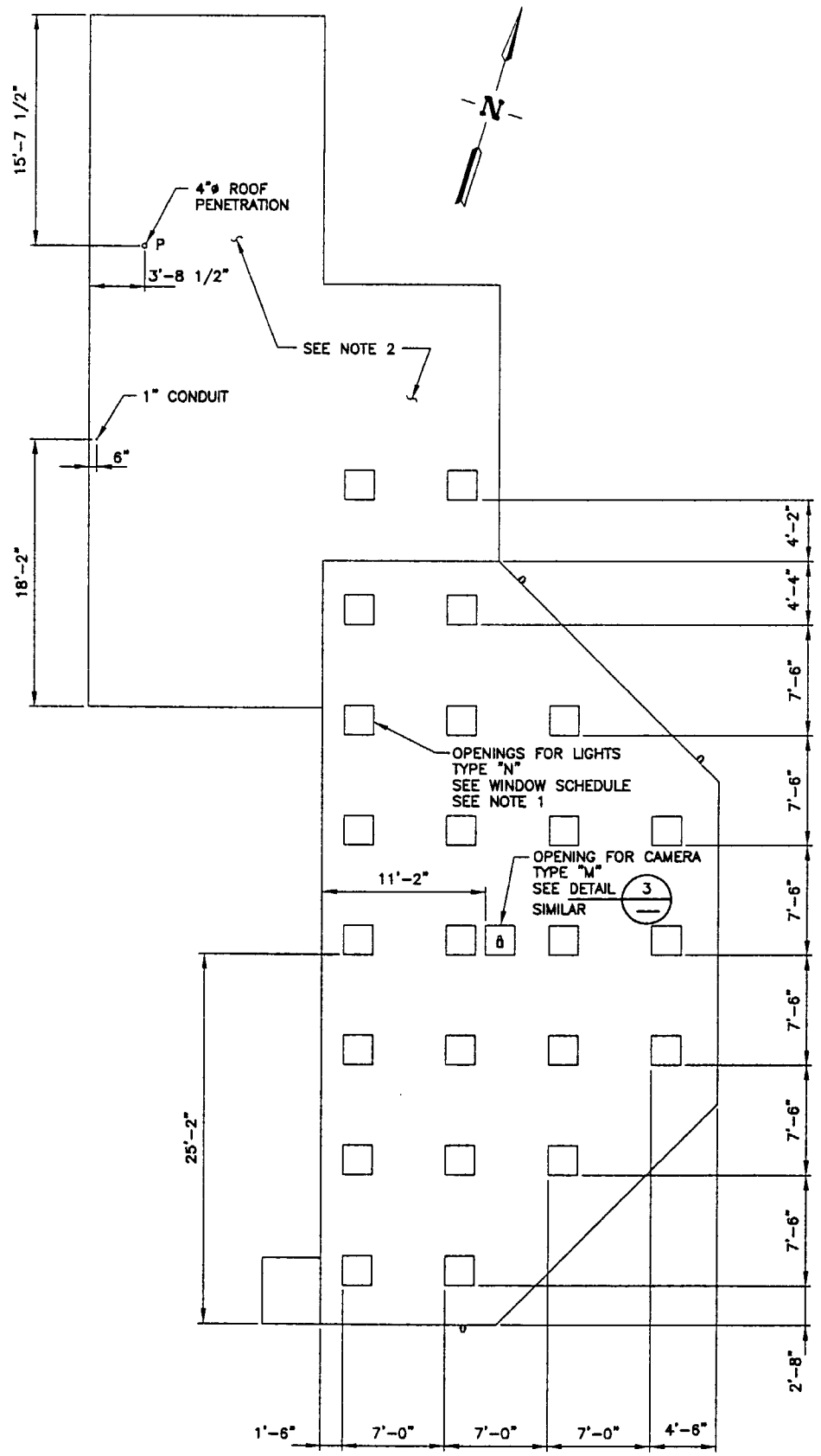
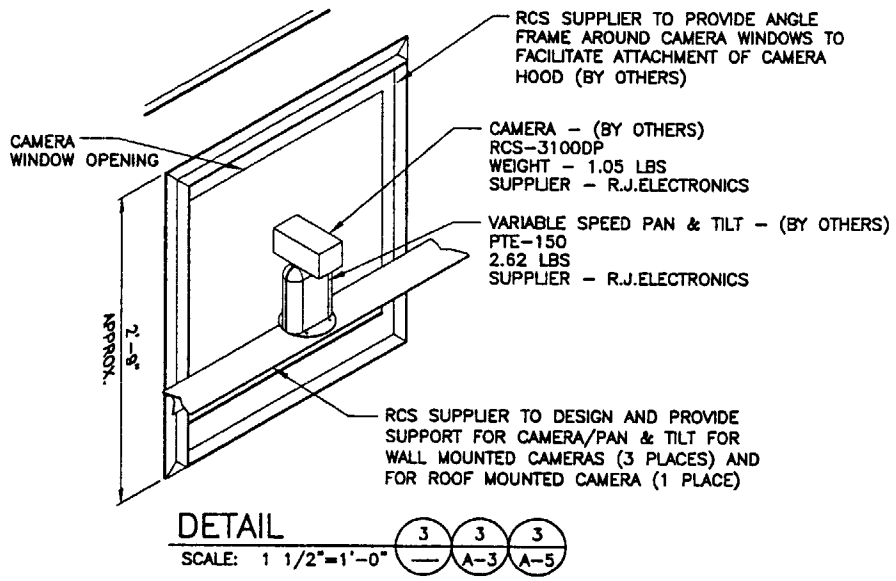
FOR DRAWING INDEX SEE DRAWING NO. 519888	SUBCONTRACT NO. N/A	INEEL Lockheed Martin Idaho Technologies Company BECHTEL BWXT IDAHO, LLC
SCALE: 1/4" = 1'-0"	REQUESTER: S.A. DAVIES	OU 7-10 GLOVEBOX EXCAVATOR METHOD PROJECT RETRIEVAL CONFINEMENT STRUCTURE
	DESIGN: S. JENSEN	VIEWS
	DRAWN: B.SEARLE	
	PROJECT NO. 021052	
	SPEC CODE REC REL	
DESIGN PHASE: PERF SPEC	FOR REVIEW/APPROVAL SIGNATURES SEE DAR NO. 90072	SIZE D; CAGE CODE 01MF3; INDEX CODE NUMBER AREA 098 TYPE 0671 CI 00 DRG 090; DWG-519893; REV
SAFETY CATEGORY: SS	EFFECTIVE DATE: 4/9/02	SCALE: NOTED; SHEET A-5

REVISIONS		
REV	DESCRIPTION	EFFECTIVE DATE:



ROOF PLAN
SCALE: 3/16"=1'-0"



DETAIL 3 3 3 (— A-3 A-5)
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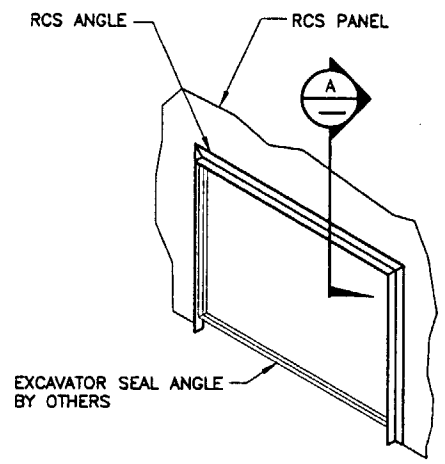

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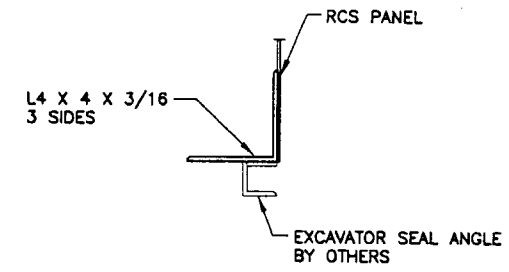

SECTION A —
SCALE: 3"=1'-0"

ROOF WINDOW LEGEND

TYPE	NOMINAL SIZE	QUANTITY	TYPE OF OPENING	GLAZING	POSITIONAL TOLERANCES	REMARKS
M	2'-0" X 2'-0"	1	WINDOW OPENING	LEXAN	HORIZ: ±6"	CAMERA
N	2'-0" X 2'-0"	24	WINDOW OPENING	LEXAN	HORIZ: ±6"	LIGHTS

NOTES

1. RCS SUPPLIER TO DESIGN AND PROVIDE BRACKET FOR LUMARK LIGHT FIXTURES. APPROXIMATELY 2" MIN. AND 4" MAX. REQUIRED BETWEEN BULB AND LEXAN SURFACES WEIGHT: APPROX. 60 LBS. PER FIXTURE. SEE APPENDIX E OF SPECIFICATION FOR ADDITIONAL INFORMATION.
2. RCS SUPPLIER TO PROVIDE ADEQUATE SUPPORT FOR METALUX (VT2-232 DR-WL) LIGHT FIXTURE ON THE INSIDE CEILING SURFACE OF THESE AREAS. SEE APPENDIX E OF SPECIFICATION FOR ADDITIONAL INFORMATION.
3. DIMENSIONS SHOWN FOR ROOF PLAN OPENINGS ARE NOMINAL.

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X-REF DRAWING
519671.dwg

REVISION: 0
ORIGINAL SIGNED BY: SCOTT ALAN JENSEN
DATE ORIGINAL SIGNED: 4/9/02
SEAL NUMBER: 4003
ORIGINAL STORED AT: EROB DOCUMENT CONTROL

REGISTERED PROFESSIONAL ENGINEER 4003 STATE OF IDAHO SCOTT ALAN JENSEN

FOR DRAWING INDEX SEE DRAWING NO. 519888	SUBCONTRACT NO. N/A
SCALE: 3/16" = 1'-0" / SCALE: 3" = 1'-0"	REQUESTER: S.A. DAVIES
DESIGN PHASE: PERF SPEC	DESIGN: S. JENSEN
SAFETY CATEGORY: SS	DRAWN: B.SEARLE
	PROJECT NO. 021052
	SPEC CODE REC REL
	FOR REVIEW/APPROVAL SIGNATURES SEE DAR NO. 90072
	EFFECTIVE DATE: 4/9/02

INEEL — Idaho National Engineering & Environmental Laboratory, BECHTEL BWXT IDAHO, LLC

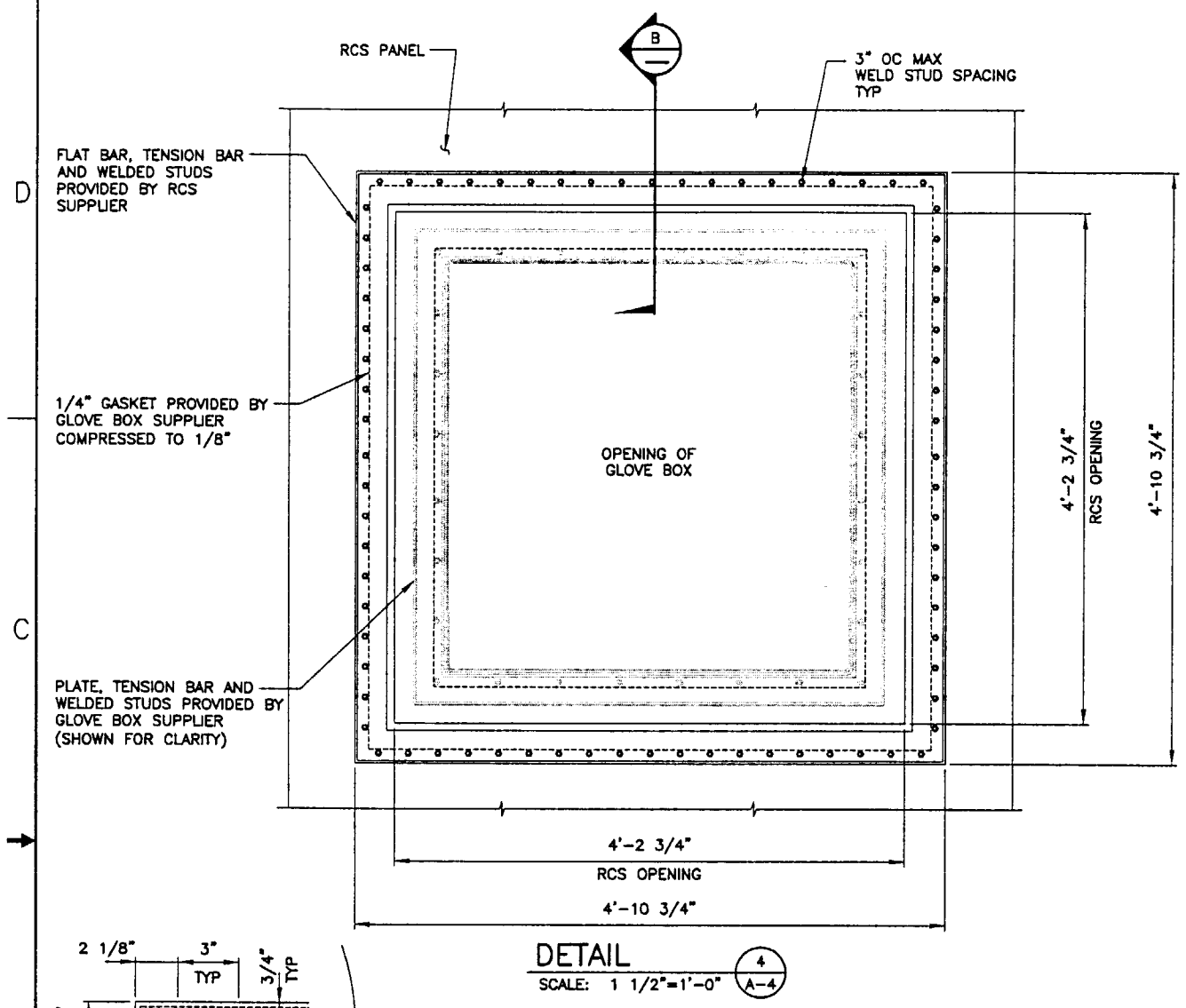
OU 7-10
GLOVEBOX EXCAVATOR METHOD PROJECT
RETRIEVAL CONFINEMENT STRUCTURE

ROOF PLAN, DETAILS AND LEGEND

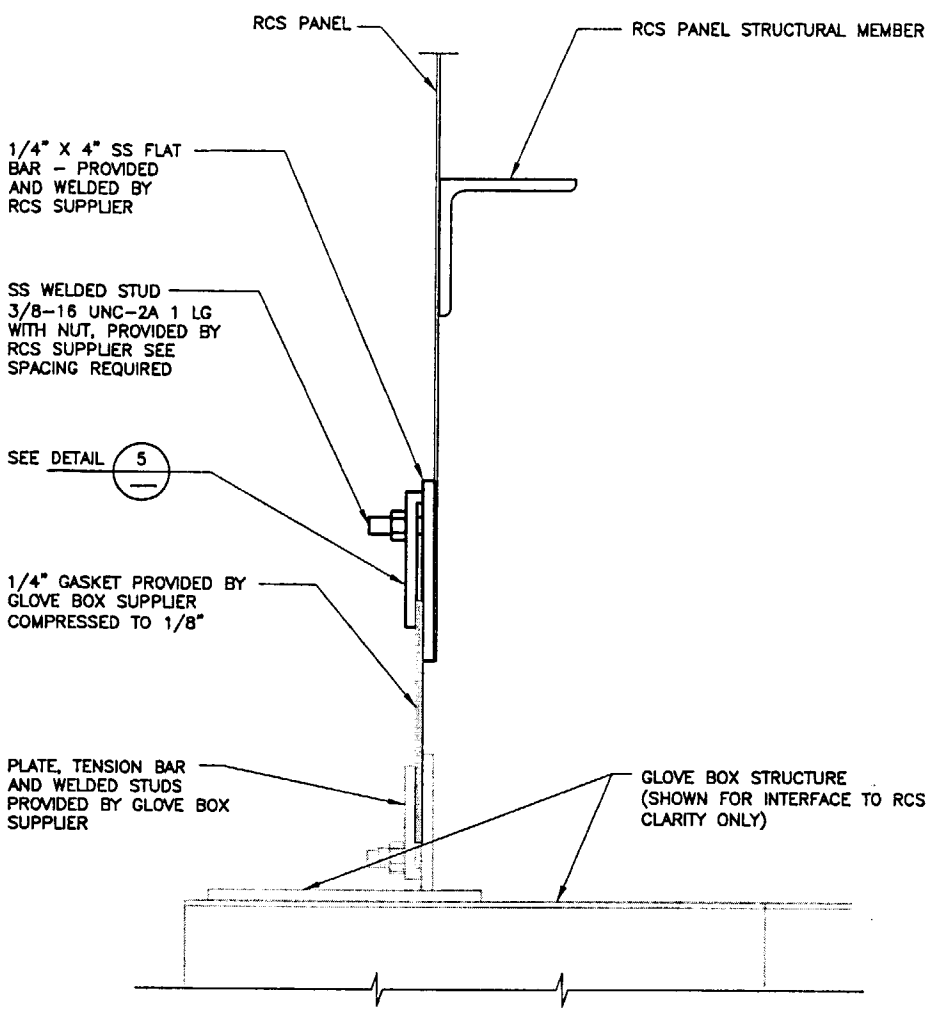
SIZE	CAGE CODE	INDEX CODE NUMBER AREA	TYPE	CI	ORIG	DWG-519894	REV
D	01MF3	098	0671	00	090		

SCALE: NOTED — SHEET A-6

REVISIONS		
REV	DESCRIPTION	EFFECTIVE DATE:
8		



DETAIL 4 / A-4
SCALE: 1 1/2"=1'-0"



SECTION B
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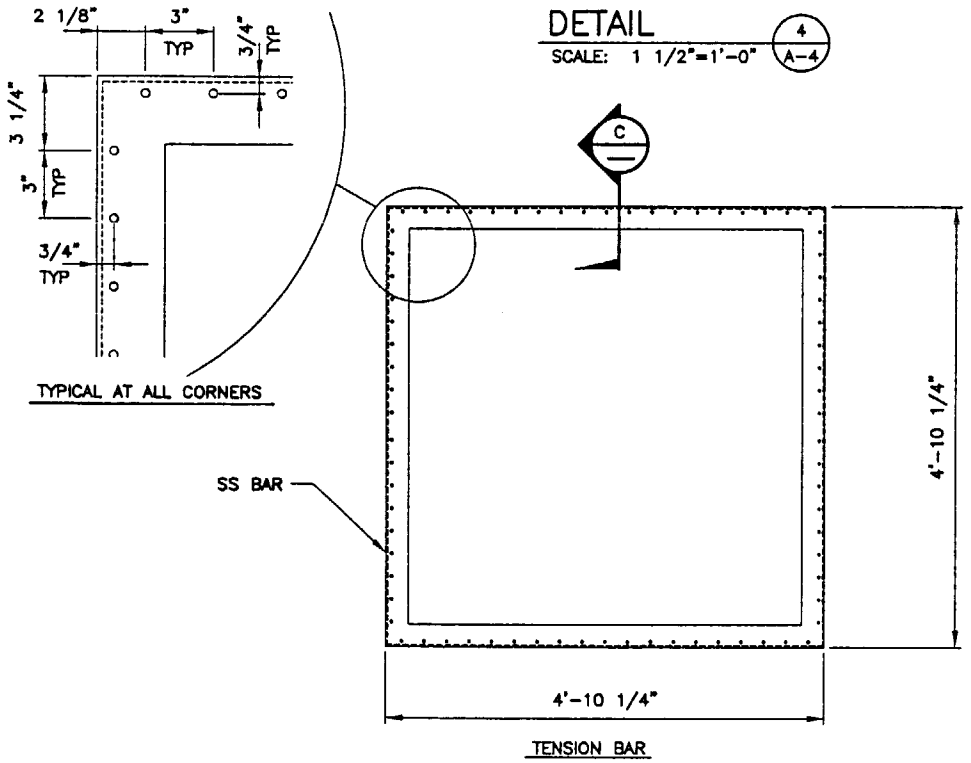

DETAIL 5
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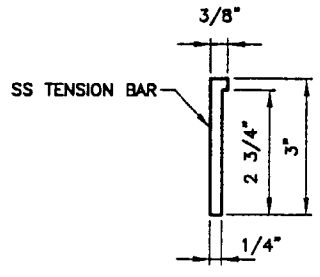

SECTION C
SCALE: 6"=1'-0"

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REVISION: 0
ORIGINAL SIGNED BY: SCOTT ALAN JENSEN
DATE ORIGINAL SIGNED: 4/9/02
SEAL NUMBER: 4003
ORIGINAL STORED AT: EROB DOCUMENT CONTROL

REGISTERED PROFESSIONAL ENGINEER 4003 STATE OF IDAHO SCOTT ALAN JENSEN

1 1/2" 1" 1/2" 0 1 1/2"
SCALE: 6" = 1'-0"

3 0 3 6 9"
SCALE: 1 1/2" = 1'-0"

1" 0 1"
SCALE: 1" = 1'-0"

FOR DRAWING INDEX SEE DRAWING NO. 519888	SUBCONTRACT NO. N/A
	REQUESTER: S.A. DAVIES
	DESIGN: S. JENSEN
	DRAWN: B.SEARLE
	PROJECT NO. 021052
	SPEC CODE REC REL
DESIGN PHASE: PERF SPEC	FOR REVIEW/APPROVAL SIGNATURES SEE DAR NO. 90072
SAFETY CATEGORY: SS	EFFECTIVE DATE: 4/9/02

INEEL (Idaho National Engineering & Environmental Laboratory) BECHTEL BWXT IDAHO, LLC

OU 7-10
GLOVEBOX EXCAVATOR METHOD PROJECT
RETRIEVAL CONFINEMENT STRUCTURE

GLOVE BOX CONNECTION SECTION AND DETAILS

SIZE	CAGE CODE	INDEX CODE NUMBER AREA	TYPE	CL	DRG	DWG-	REV
D	01MF3	098	0671	60	090	519895	

SCALE: NOTED
SHEET A-7

Appendix C

Penetrations, Attachments, and Interfaces for RCS and Related Structures

PENETRATIONS, ATTACHMENTS and INTERFACES for RCS and RELATED STRUCTURES

*	I.D. NO.	IDENTIFICATION SYSTEM	IDENTIFICATION STRUCTURE	PENETRATION SIZE	LOCATION	PHYSICAL WEIGHT In lb. POWER REQUIREM'T	CRITICAL DESIGN CONSIDERATIONS SIGNIFICANT CHARACTERISTICS	STRUCTURAL SUPPORT REQUIRED	SEALS TYPE & DESIGN
PERS MON	1	Insulated, Overhead Coiling Equipment door	Through WES wall as noted on drawings	nom 14'-0" x 12'-0" opening aff	North of center of the west facing wall of WES.	Skirt around opening	Exterior mount, vertically supported. Provide opening for door to be mounted on exterior of weatherproof enclosure structure		No special requirements
TRAN/ VEST	2	Insulated, Overhead Coiling Equipment door	Through Transfer Vestibule wall as noted on drawings	10'-0" x 10'-0" aff	North end of Transfer Vestibule into the WES.	Provide power operated OH door, shipping wg't 1535 lb	Exterior mount, to WES side, vertically supported. Provide adequate structural support for selected door assembly	Vertically supported	No special requirements
TRAN/ VEST	3	Personnel Door	Through WES wall as noted on drawings	3'-0" x 7'-0" aff nom 4'-0" x 8'-0" aff	Towards north end of the west facing wall of WES.				
PERS MON	4	Personnel Door	From WES into personnel monitoring area	3'-0" x 7'-0" aff	Through common wall between WES and Personnel Monitoring.		Provide 2'x2' viewing lite in personnel door.		
PERS MON	5	Personnel Door	From personnel monitoring area into Transfer Vestibule.	3'-0" x 7'-0" aff	Through common wall between the Personnel Monitoring Area and Transfer Vestibule.		Provide 2'x2' viewing lite in personnel door.		
RCS	6	Personnel Door	From RCS to Personnel Access	3'-0" x 7'-0" aff	Through common wall between the RCS into Personnel Access		To accommodate protected personnel entry for unique activities. Provide 2'x2' viewing lite in personnel door.		Tight seal critical to maintenance of negative air pressure.
RCS	7	Personnel Door	From Personnel Access to Monitoring	3'-0" x 7'-0" aff	Through common wall between the Personnel Access and Personnel Monitoring Area		To provide change area and airlock for personnel entry to a contaminated area. Provide 2'x2' viewing lite in personnel door.		Tight seal critical to maintenance of negative air pressure.
RCS	8	Pair of 3'-0" x 7'-0" Personnel Door	Through RCS wall as noted on drawings	6'-0" x 7'-0" aff	From RCS to Transfer Vestibule		Accommodate movement of soil sacks prior to process operations. Provide 2'x2' viewing lite in each door panel.		Tight seal critical to maintenance of negative air pressure.
RCS	9	Personnel Door	Through RCS wall into vestibule as shown on drawings	3'-0" x 7'-0" aff	Towards south end of the west facing wall.		Emergency only, personnel exit door. Provide 2'x2' viewing lite in personnel door.		Tight seal critical to maintenance of negative air pressure.
RCS	10	Personnel Door	From vestibule into WES area as shown on drawings	3'-0" x 7'-0" aff	Vestibule located towards southwest end of the RCS.		Emergency only, personnel exit door from vestibule. Provide 2'x2' viewing lite in personnel door.		Tight seal critical to maintenance of negative air pressure.
RCS	11	(6) ea Lexan Windows	Northeast RCS wall	2'-0" x 2'-0" ea	Locate Lexan windows for viewing and cameras through RCS wall where shown on drawings	60 lb ea			All windows shall be sealed to withstand the negative air pressure required in the process area.
RCS	12	(4) ea Lexan Windows	East RCS wall	2'-0" x 2'-0" ea	Locate Lexan windows through RCS wall where shown on drawings	60 lb ea			All windows shall be sealed to withstand the negative air pressure required in the process area.
RCS	13	(3) ea Lexan Windows	Southeast RCS wall	2'-0" x 2'-0" ea	Locate Lexan windows through RCS wall where shown on drawings	60 lb ea			All windows shall be sealed to withstand the negative air pressure required in the process area.

NOTE: List all penetrations through the WES, FFS, RCS and Gloveboxes.

* *Specifc Structure affected*

PENETRATIONS, ATTACHMENTS and INTERFACES for RCS and RELATED STRUCTURES

*	I.D. NO.	IDENTIFICATION		PENETRATION SIZE	LOCATION	PHYSICAL WEIGHT in lb. POWER REQUIREM'T	CRITICAL DESIGN CONSIDERATIONS SIGNIFICANT CHARACTERISTICS	STRUCTURAL SUPPORT REQUIRED	SEALS TYPE & DESIGN
		SYSTEM	STRUCTURE						
RCS	14	(5) ea Lexan Windows	West RCS wall	8'-0" x 4'-0"	Locate Lexan windows around excavator through RCS wall where shown on drawings				All windows shall be sealed to withstand the negative air pressure required in the process area.
RCS	15	(23) ea Lexan Windows	RCS ceiling	2'-0" x 2'-0" ea	Locate Lexan windows to accommodate lighting and video camera, layout shown on drawings	60 lb ea	Locate support for 60 lb light adjacent to each window		All windows shall be sealed to withstand the negative air pressure required in the process area.
WES/ RCS	16	(2) ea Lexan Windows	Personnel Access Ceiling	2'-0" x 2'-0" ea	Locate Lexan windows in Personnel Access Ceiling to accommodate lighting layout shown on drawings	60 lb ea	Locate support for 60 lb light adjacent to each window		All windows shall be sealed to withstand the negative air pressure required in the process area
FFS RCS	17	Deluge Fire Water Supply to RCS (Monitor Nozzle System)	Through the Facility Floor Structure steel perimeter & intermediate framing members to RCS	2-1/2" dia pipe	Install through perimeter steel web on north side of WES floor and through intermediate webs from south side of WES and penetrate up through the RCS floor		Downward thrust of XXXX psi operating force at RCS nozzle, will need to provide adequate bracing to stabilize		Through RCS floor, southeast corner bolted flange in XXX seal
FFS RCS	18	Deluge Fire Water Supply to RCS (Monitor Nozzle System)	Through the Facility Floor Structure steel perimeter & intermediate framing members to RCS	2-1/2" dia pipe	Install through perimeter steel web on north side of WES floor and through intermediate webs from north side of WES and penetrate up through the RCS floor		Downward thrust of XX psi operating force at RCS nozzle, will need to provide adequate bracing to floor of RCS to stabilize.		Through RCS floor, northeast corner bolted flange in XXX seal
FFS RCS	19	Dry Pipe Supply to RCS, (Overhead System)	Through the Facility Floor Structure steel perimeter & intermediate framing members to RCS	4" dia pipe	Install through perimeter steel web on north side of WES floor and through intermediate webs from north side of WES and penetrate up through the RCS floor		Additional collateral loads	Structural supports across RCS ceiling	Seal where pipe enters through RCS floor next to north wall of the RCS
TRANS VEST	20	Fire Alarm (MFA)	From WES into transfer vestibule area	1/2" conduit	Penetrate through ceiling at personnel door for MFA	MFA, 1 lb			SST
RCS	21	Dust Suppression/ Fog and Spray System	From WES into RCS above PGS No. 1	(2) ea 2" flexible conduit	Penetrate approximately 20'-6" aff				
RCS	22	Dust Suppression, Fog and Spray System	From WES into RCS above PGS No. 2	(2) ea 1" dia pipe	Penetrate approximately 20'-0" aff				
RCS	23	Dust Suppression, Fog and Spray System	From WES into RCS above PGS No. 3	(2) ea 1" dia pipe	Penetrate approximately 19'-6" aff				
PERS MON	24	Fire Water Sprinkler Piping	From Personnel Monitoring Area into Personnel Access Area	1" dia pipe	Penetrate through the middle of the wall 8" below ceiling				

NOTE: *List all penetrations through the WES, FFS, RCS and Gloveboxes.*

* *Specifc Structure affected*

PENETRATIONS, ATTACHMENTS and INTERFACES for RCS and RELATED STRUCTURES

*	I.D. NO.	IDENTIFICATION		PENETRATION SIZE	LOCATION	PHYSICAL WEIGHT in lb. POWER REQUIREM'T	CRITICAL DESIGN CONSIDERATIONS SIGNIFICANT CHARACTERISTICS	STRUCTURAL SUPPORT REQUIRED	SEALS TYPE & DESIGN
		SYSTEM	STRUCTURE						
TRANS VEST/ PERS MON	25	Fire Water Sprinkler Piping	From Transfer Vestibule into Personnel Monitoring Area	1-1/4" dia pipe	Penetrate south of personnel door 8" below ceiling				
TRANS VEST ROOF	26	Fire Water Sprinkler Piping	Through Transfer Vestibule Roof	4" dia pipe	Penetrate through the roof 15'-7-1/2" south and 3'-8-1/2" east of northwest corner				
RCS	27	Dust Suppression/Fog and Spray System	Through RCS west wall	(6) ea. 2" flexible conduit	(6) pipe penetrations through RCS south end of west wall				
WES/ TRANS VEST	28	Power	From WES into transfer vestibule area	1" conduit	Power for Miscellaneous Receptacles and Motors (including fan and door operators)			Support disconnect and fan, door operators, disconnect and motor for OH door and receptacles	SST conduit with seal around all wires
WES/ TRANS VEST	29	Lighting	From WES into transfer vestibule area	1" conduit	Power for lighting	Light 16 lb each		Support light above door. Conduit through wall	SST conduit with seal around all wires
PERS ACCES to RCS	30	Power	From Personnel Access into RCS area	(2) 1" conduit	Power for Receptacles and exit lights	Light 16 lb each		Support light above door and duplex receptacle on wall. Conduit through wall	SST conduit with seal around all wires
PERS MON to PERS ACCES	31	Power	From Personnel Monitoring to Personnel Access area	(2) 1" conduit	Power for Receptacles and Lights	Light 16 lb each		Support light on ceiling. Conduit through wall	SST conduit with seal around all wires
PERS MON to RCS	32	Power	From Personnel Access area into RCS	1" dia	Power to Exit/Emergency Light over personnel door into personnel access			Conduit through wall	SST conduit with seal around all wires
RCS	33	Video Camera	Mount to outside of RCS roof @ window		Mount outside of RCS roof to RCS	10 lb including mounting bracket	Attach mounting bracket to RCS exoskeleton, viewing through 2' x 2' Lexan window. Provide shroud over camera. Standard "Off-the Shelf", no long lead time.	Mounting brackets on RCS exoskeleton. Support cable tray and conduit	
RCS	34	Video Camera	Mount to outside of RCS wall @ window		Mount outside of northeast wall of RCS above PGS 1	10 lb including mounting bracket	Attach mounting bracket to RCS exoskeleton, viewing through 2' x 2' Lexan window. Provide shroud over camera. Standard "Off-the Shelf", no long lead time.	Mounting brackets on RCS exoskeleton. Support cable tray and conduit	
RCS	35	Video Camera	Mount to outside of RCS wall @ window		Mount outside of east wall of RCS above PGS 2	10 lb including mounting bracket	Attach mounting bracket to RCS exoskeleton, viewing through 2' x 2' Lexan window. Provide shroud over camera. Standard "Off-the Shelf", no long lead time.	Mounting brackets on RCS exoskeleton. Support cable tray and conduit	

NOTE: List all penetrations through the WES, FFS, RCS and Gloveboxes.

* *Specifc Structure affected*

PENETRATIONS, ATTACHMENTS and INTERFACES for RCS and RELATED STRUCTURES

*	I.D. NO.	IDENTIFICATION		PENETRATION SIZE	LOCATION	PHYSICAL WEIGHT in lb. POWER REQUIREM'T	CRITICAL DESIGN CONSIDERATIONS SIGNIFICANT CHARACTERISTICS	STRUCTURAL SUPPORT REQUIRED	SEALS TYPE & DESIGN
		SYSTEM	STRUCTURE						
RCS	36	Video Camera	Mount to outside of RCS wall @ window		Mount outside of south wall of RCS above mech HEPA filter bank	10 lb including mounting bracket	Attach mounting bracket to RCS exoskeleton, viewing through 2' x 2' Lexan window. Provide shroud over camera. Standard "Off-the Shelf", no long lead time.	Mounting brackets on RCS exoskeleton. Support cable tray and conduit	
RCS	37	PGS No. 1 interface with the RCS	Through the RCS panel to match the entrance to the PGS	Penetration size 50.75 x 50.75 inches	The three PGS locations		The RCS panel attaching to the PGS will be 6 feet wide instead of the standard 4 feet		A gasket will be installed between the PGS and the RCS at the penetration.
RCS	38	PGS No. 2 interface with the RCS	Through the RCS panel to match the entrance to the PGS	Penetration size 50.75 x 50.75 inches	The three PGS locations		The RCS panel attaching to the PGS will be 6 feet wide instead of the standard 4 feet		A gasket will be installed between the PGS and the RCS at the penetration.
RCS	39	PGS No. 3 interface with the RCS	Through the RCS panel to match the entrance to the PGS	Penetration size 50.75 x 50.75 inches	The three PGS locations		The RCS panel attaching to the PGS will be 6 feet wide instead of the standard 4 feet		A gasket will be installed between the PGS and the RCS at the penetration.
RCS	40	Glove Ports for Backhoe Hydraulic End Effector Connection and Core Sample Retrieval	Through an RCS Lexan window located within the alcove for the glove ports and bag out station.	15.2" x 9.2" oval positioned 15 degrees off the vertical axis at 16.5" separation from center	Locate in the north lower 8 x 4 Lexan window				
RCS	41	Bag Out Port for Underburden Core Samples	Through an RCS Lexan window located within the alcove for the glove ports and bag out station.	15.2" x 9.2" oval positioned 90 degrees off the vertical axis	Locate in the north lower 8 x 4 Lexan window				
WES/ RCS	42	Air Sampling Ports	North of Glove Ports	(2) 4" dia	Locate (1) at 1'-0" aff and locate (1) at 4'-0" aff				
PERS ACCES to RCS	43	Power Receptacle		Sealed Wall Plate	Common wall between the Personnel Access and RCS				
RCS	44	Backhoe Boom and Stick Penetration into the RCS	Through a rectangular hole in the RCS.	6' Horizontal x 4'-7" Vertical	Centerline of hole is located 26' away from the southmost RCS wall and ends at the floor		Bottom framing of the backhoe penetration is not necessary.	3x3x3/16 angle iron	
RCS	45	Breathing Air System (3.6.6)	Through RCS structure	2" H x 3" Vertical	Slot is located south side of double door frame leading into the RCS, approximately 4'-0" aff.		Pass-thru to allow for passage of breathing air hoses while the door remains shut.		
RCS	46	Ventilation	Penetration through common wall of Personnel Monitoring / Pers Access Wall	24" x 24"	North wall east side, 6" below ceiling		Air transfer grille		
RCS	47	Ventilation	Penetration through Transfer Vestibule & WES wall to north	24" x 24"	North wall, west side, 6" below ceiling		Air transfer grille		

NOTE: List all penetrations through the WES, FFS, RCS and Gloveboxes.

* *Specifc Structure affected*

PENETRATIONS, ATTACHMENTS and INTERFACES for RCS and RELATED STRUCTURES

*	I.D. NO.	IDENTIFICATION		PENETRATION SIZE	LOCATION	PHYSICAL WEIGHT in lb. POWER REQUIREM'T	CRITICAL DESIGN CONSIDERATIONS SIGNIFICANT CHARACTERISTICS	STRUCTURAL SUPPORT REQUIRED	SEALS TYPE & DESIGN
		SYSTEM	STRUCTURE						
RCS	48	Ventilation	RCS inlet air	12" dia.	To personnel access room 12" dia., 26" AFF		RCS inlet air filter and damper		
RCS	49	Ventilation	RCS inlet air	30" dia.	To personnel access room 30" dia., 14' + AFF		RCS inlet air filter and damper		
RCS	50	Ventilation	Penetration through Transfer Vestibule and WES, north wall.	14" x 14"	North wall of Transfer Vestibule and WES, 10'-0" AFF	100 lb	Transfer Vestibule supply air fan	Yes	
RCS	51	Ventilation	Penetration through RCS	18" x 7'-6"	South wall of RCS to the east end		RCS exhaust air		
RCS	52	Grouting Pipe	Pipe through west wall south of double doors	8" dia	Sched 40 grout transfer pipe through RCS, capped for future use		Pipe-12" long, 6" end each side of wall. Ends threaded and capped and sealed with silicone.	Provide support for pipe	Seal weld around pipe.
RCS	53	CO Monitoring System	Through roof of RCS (2) places	(2) 1/2" dia tube	Along west side of RCS roof (1) towards the north and (1) towards the south. Provide bulkhead fittings or welded nipple. TBD				

NOTE: List all penetrations through the WES, FFS, RCS and Gloveboxes.

* *Specifc Structure affected*

Appendix D

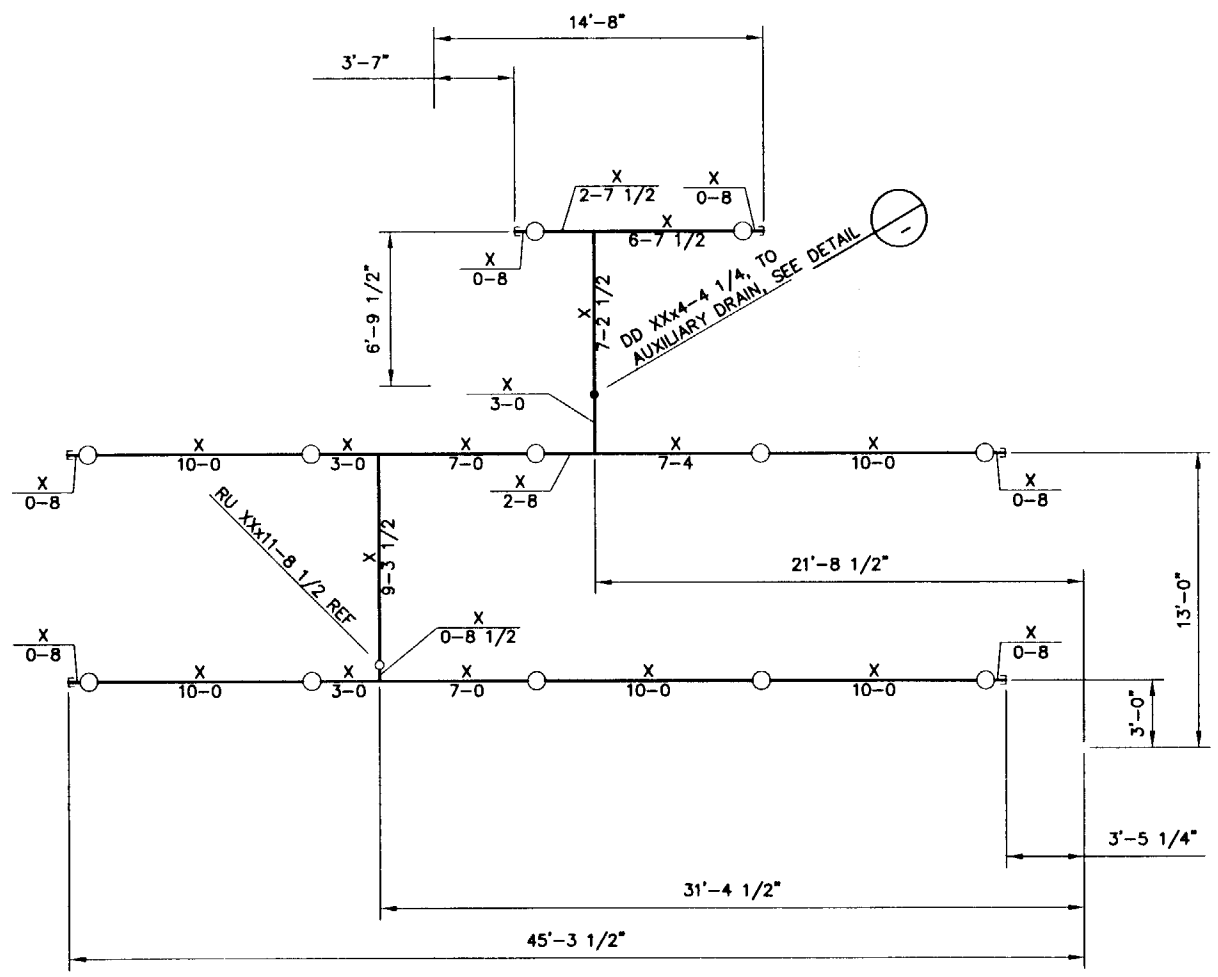
Fire Protection Piping Layout Drawings

(For Information Only)

FMT-01-REV 3.2

REVISIONS		
REV	DESCRIPTION	EFFECTIVE DATE:

RCS



WES DRY FIRE PROTECTION SYSTEMS LOWER PLAN

SCALE: 1/4"=1'-0"

X-REF DRAWING

519671
519675

FOR DRAWING INDEX SEE DRAWING NO. T-2	SUBCONTRACT NO	INEEL (Idaho National Engineering & Environmental Laboratory) BECHTEL BWXT IDAHO, LLC
SCALE: 1/4" = 1'-0"	REQUESTER: SA DAVIES	OU 7-10 GLOVEBOX EXCAVATOR METHOD PROJECT WES
	DESIGN: JD JENSEN	WES LOWER PLAN
	DRAWN: TB UMPHLETTE	
	PROJECT NO. 021052	
	SPEC CODE	
DESIGN PHASE: TITLE II	FOR REVIEW/APPROVAL SIGNATURES	SIZE D; CAGE CODE 01MF3; INDEX CODE NUMBER AREA 098 TYPE 0671 CL 52 DWG 090; DWG; REV
SAFETY CATEGORY: SEE GENERAL NOTES	SEE DAR NO.	SCALE: NOTED; SHEET FP-4
	EFFECTIVE DATE:	

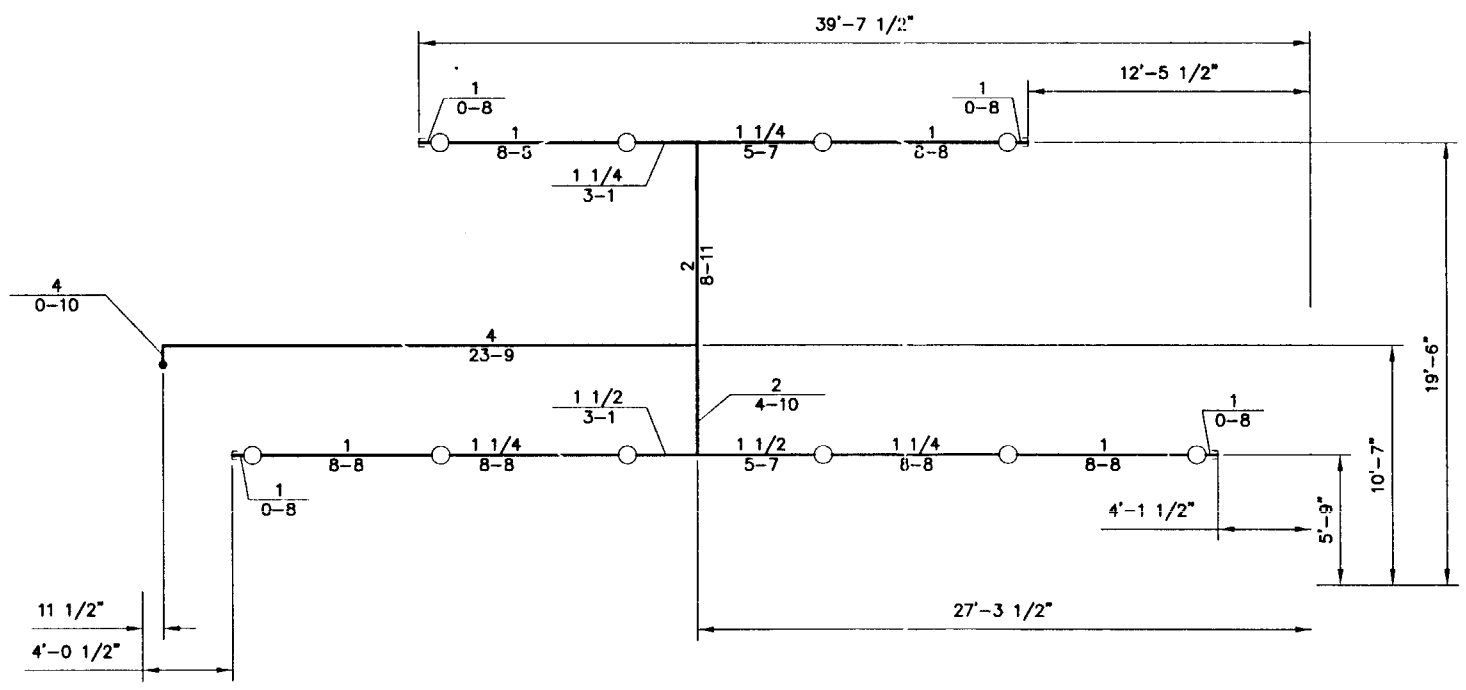
Layout Name: Layout1
Date: 03/15/02 - 3:22 P.M.
phase 3_FP-4 DWG.DWG
h: d:\fire protection\Phase 3

FMT-01-REV 3.2

REVISIONS		
REV	DESCRIPTION	EFFECTIVE DATE

PGS, 3 PLACES

RCS



RCS DRY AND MANUAL DELUGE FIRE PROTECTION SYSTEMS PLAN

NOTES

1. DELUGE SYSTEM FOR THE RETRIEVAL CONFINEMENT STRUCTURE SHALL SHALL BE CLASSIFIED AS EXTRA HAZARD OCCUPANCY GROUP 1 PER NFPA.

X-REF DRAWING

519674-B.dwg
519675-B.dwg

FOR DRAWING INDEX SEE DRAWING NO. T-2	SUBCONTRACT NO.	INEEL (Lockheed Martin Engineering & Environmental Services) BECHTEL BWXT IDAHO, LLC
SCALE: 1/4" = 1'-0"	REQUESTER: SA DAVIES	OU 7-10 GLOVEBOX EXCAVATOR METHOD PROJECT WES / RCS
	DESIGN: JD JENSEN	RCS PLAN
	DRAWN: TB UMPHLETTE	
	PROJECT NO. 021052	
	SPEC CODE	
DESIGN PHASE: TITLE II	FOR REVIEW/APPROVAL SIGNATURES SEE DAR NO.	SIZE D; CAGE CODE 01MF3; INDEX CODE NUMBER AREA 098 TYPE 0671 CL 52 ORG 090; DWG; REV
SAFETY CATEGORY: SEE GENERAL NOTES	EFFECTIVE DATE:	SCALE: 1/4"=1'-0"; SHEET FP-8

Layout Name: Layout1
Date: 03/15/02 - 3:22 P.M.
phase 3_FP-8 DADE UMPHLETTE
d:\fire protection\Phase 3

Appendix E

Proposed Lighting Fixture Vendor Cut Sheets and Layout Drawing

Type A

LUMARK®

DESCRIPTION

The Lumark Nighthawk III utilizes a soft-cornered aerodynamic design to provide excellent EPA ratings and an aesthetically pleasing appearance. Dark bronze polyester powder coat finish assures corrosion resistance and long-lasting aesthetics. U.L. 1572 listed and labeled for wet locations. CSA certified.

APPLICATION

The Nighthawk III uses an innovative die-cut optical design which delivers maximum beam control for storage areas, rail yards, loading docks and building perimeters.

SPECIFICATION FEATURES

A···Latches
Formed aluminum flush draw-action latches offer easy access to lamp compartment without tools and maintain integrity of seal when closed.

B···Housing
Aerodynamically designed die-cast aluminum housing has low EPA rating.

C···Door
Die-cast aluminum with integral cast hinges for removal without tools.

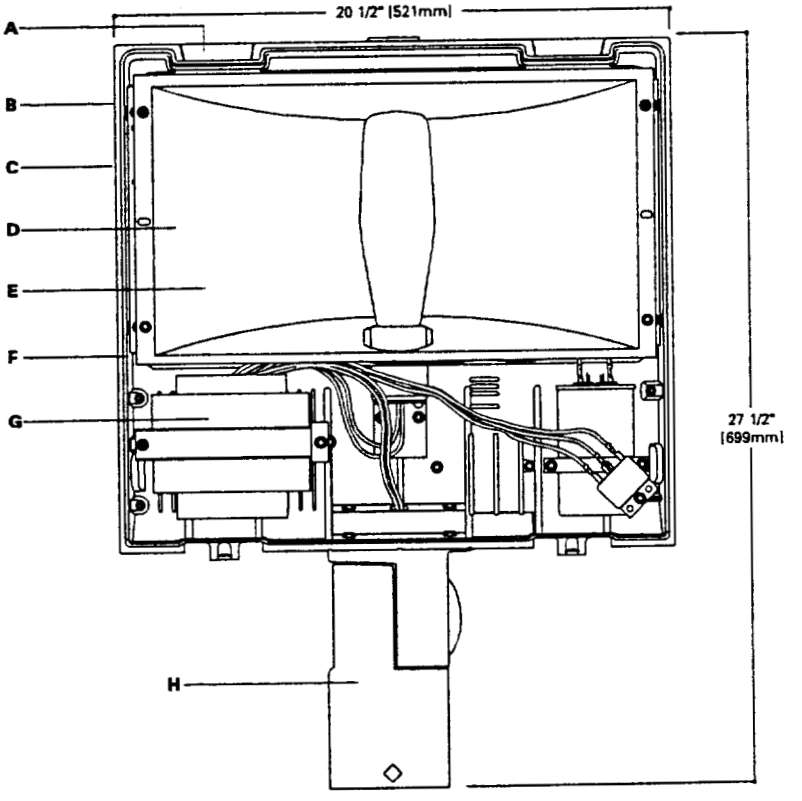
D···Lens
Heat- and impact-resistant tempered glass. Lens is mounted flush with door surface to reduce wind drag and prevent dirt or moisture from accumulating.

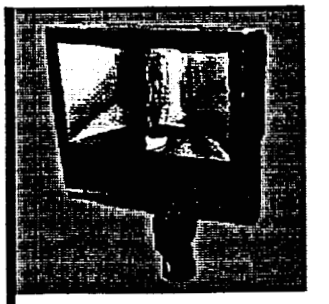
E···Reflector
Computer designed die-cut reflector system delivers superior beam control and efficiency.

F···Gasket
Door gasket is foam-in-place silicone, providing maximum protection of interior components from the elements.

G···Ballast
Ballast components are hard mounted to fixture housing for maximum heat dissipation and extended component and lamp life.

H···Mounting
Die-cast aluminum integral slipfitter mounts on nominal 2 3/8" or 3" O.D. tenons. A degree-marked quadrant is cast in for easy and accurate aiming.



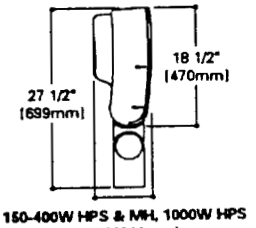


NKNIGHTHAWK III

150-1000W
High Pressure Sodium
Metal Halide

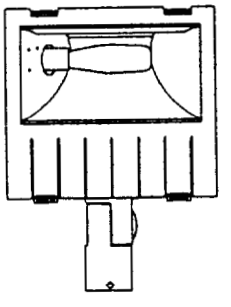
SLIPFITTER FLOODLIGHT

DIMENSIONS



150-400W HPS & MH, 1000W HPS
9 1/2" [241mm]
1000W MH
10 1/2" [267mm]

1000W LAMP PLACEMENT



ENERGY DATA

Hi-Reactance Ballast Input Watts
150W MH HPF (190 Watts)

Reactor Ballast Input Watts
150W MH HPF (185 Watts)

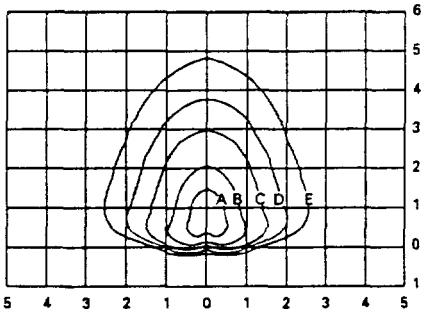
CWI Ballast Input Watts
250W HPS HPF (300 Watts)

CWA Ballast Input Watts
175W MH HPF (210 Watts)
200W HPS HPF (250 Watts)
200W MP HPF (232 Watts)
250W MH HPF (295 Watts)
320W MP HPF (365 Watts)
350W MP HPF (395 Watts)
400W MH HPF (455 Watts)
400W HPS HPF (465 Watts)
400W MP HPF (448 Watts)
600W HPS HPF (665 Watts)
750W HPS HPF (835 Watts)
750W MP HPF (835 Watts)
1000W MH HPF (1080 Watts)
1000W HPS HPF (1100 Watts)

ADH991213

COOPER LIGHTING

PHOTOMETRICS



HPNK-_76-400
400-Watt HPS
50,000-Lumen Clear Lamp

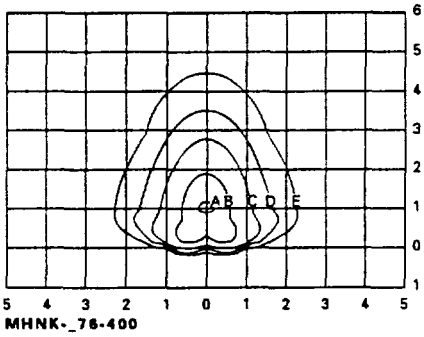
Footcandle Table

Select mounting height and read across for footcandle values of each isofootcandle line. Distance in units of mounting height.

Mounting Height	Footcandle Values for Isofootcandle Lines				
	A	B	C	D	E
20'	10.00	5.00	2.00	1.00	0.50
25'	6.40	3.20	1.28	0.64	0.32
30'	4.44	2.22	0.89	0.44	0.22
35'	3.27	1.63	0.65	0.33	0.16
40'	2.50	1.25	0.50	0.25	0.13

Floodlight Summary

Maximum Candlepower	25981 CD
Maximum Candlepower Vertical Angle	0 Degrees
Maximum Candlepower Horiz. Angle	0 Degrees
Beam Flux—10% of Max.	34125 Lumens
Beam Efficiency—10% of Max.	68.3 Percent
Total Flux	35230 Lumens
Total Efficiency	70.5 Percent



MHNK-_76-400
400-Watt MH
36,000-Lumen Clear Lamp

Footcandle Table

Select mounting height and read across for footcandle values of each isofootcandle line. Distance in units of mounting height.

Mounting Height	Footcandle Values for Isofootcandle Lines				
	A	B	C	D	E
20'	10.00	5.00	2.00	1.00	0.50
25'	6.40	3.20	1.28	0.64	0.32
30'	4.44	2.22	0.89	0.44	0.22
35'	3.27	1.63	0.65	0.33	0.16
40'	2.50	1.25	0.50	0.25	0.13

Floodlight Summary

Maximum Candlepower	20218 CD
Maximum Candlepower Vertical Angle	-5° Degrees
Maximum Candlepower Horiz. Angle	0 Degrees
Beam Flux—10% of Max.	25534 Lumens
Beam Efficiency—10% of Max.	72.9 Percent
Total Flux	26236 Lumens
Total Efficiency	72.9 Percent

EPA Ratings: Slipfitter Mounting

Fixture Angle	Wind Direction (sq. ft.) Front	Side
45° from Horizontal	2.7	1.2
90° from Horizontal	4.2	1.2
0° from Horizontal	1.1	1.2

ORDERING INFORMATION

SAMPLE NUMBER: HPNK-S76-400-MT-Q

SPECIFY

MH	NK	S	76	250	***		FA63

Lamp Type
HP=High Pressure Sodium
MH=Metal Halide
MP=Pulse Start MH (CWA)[4]
MR=Pulse Start MH (Mag. Reg.)[4]
ML=Pulse Start MH (Linear Reactor)[3,4]

Series
NK=Nighthawk III

Mounting Type[1]
S=Slipfitter

Beam Spread
76=7Hx6V

Lamp Wattage
150=150W
175=175W
200=200W
250=250W
320=320W[2]
350=350W[2]
400=400W
600=600W
750=750W[6]
1000=1000W

Voltage[5]
120V
208V
240V
277V
347V
480V
MT=Multi-Tap[4]
TT=Triple-Tap[4]

Options (add as suffix)
PER=NEMA Twistlock Photocontrol Receptacle
F1=Single Fuse (120, 277 or 347V)
F2=Double Fused (208, 240 or 480V)
Q=Quartz Restrike DC Bayonet Base (Hot strike only)
EM=Quartz Restrike Cold Start Time Delay Relay (not available in 1000W)
T=Removable Quick-Disconnect Power Tray (cannot be used with 1000W units)

Accessories (order separately)
TV/NK=Top or Bottom Visor
SV1/NK=Single Side Visor
SV/NK=Double Side Visor
WG/NK=Wire Guard
OA1013=Shorting Cap for NEMA Twistlock Photocontrol Receptacle
OA1016=Photoelectric Control, 105-285-Volt NEMA Type
OA1027=Photoelectric Control, 480 Volt NEMA Type
OA1028=Field Installed NEMA Twistlock Photocontrol Receptacle (order photocontrol separately)
OA1201=Photoelectric Control, 347 Volt NEMA Type
VS/NK=Vandal Shield
LL=Lamp Included

Catalog Number	Lamp Type/Base	Lamp Wattage	Ballast Type/ Power Factor	Voltage	Beam Spread	Mounting Type	Net Wt. (lbs.)	Shipping Volume (cu.ft.)
HPNK-S76-150-MT	HPS/Mogul	150	Hi.-X/HPF	Multi-Tap	7x6	Slipfitter	41	3.6
HPNK-S76-250-MT	HPS/Mogul	250	CWI/HPF	Multi-Tap	7x6	Slipfitter	47	3.6
HPNK-S76-400-MT	HPS/Mogul	400	CWA/HPF	Multi-Tap	7x6	Slipfitter	49	3.6
HPNK-S76-400-480V	HPS/Mogul	400	CWA/HPF	480V	7x6	Slipfitter	49	3.6
HPNK-S76-600-MT	HPS/Mogul	600	CWA/HPF	Multi-Tap	7x6	Slipfitter	51	3.6
HPNK-S76-600-480V	HPS/Mogul	600	CWA/HPF	480V	7x6	Slipfitter	51	3.6
HPNK-S76-750-MT	HPS/Mogul	750	CWA/HPF	Multi-Tap	7x6	Slipfitter	53	3.6
HPNK-S76-750-480V	HPS/Mogul	750	CWA/HPF	480V	7x6	Slipfitter	53	3.6
HPNK-S76-1000-MT	HPS/Mogul	1000	CWA/HPF	Multi-Tap	7x6	Slipfitter	54	3.6
HPNK-S76-1000-480V	HPS/Mogul	1000	CWA/HPF	480V	7x6	Slipfitter	54	3.6
MHNK-S76-175-MT	MH/Mogul	175	CWA/HPF	Multi-Tap	7x6	Slipfitter	41	3.6
MHNK-S76-250-MT	MH/Mogul	250	CWA/HPF	Multi-Tap	7x6	Slipfitter	47	3.6
MHNK-S76-400-MT	MH/Mogul	400	CWA/HPF	Multi-Tap	7x6	Slipfitter	49	3.6
MHNK-S76-1000-MT	MH/Mogul	1000	CWA/HPF	Multi-Tap	7x6	Slipfitter	55	3.6

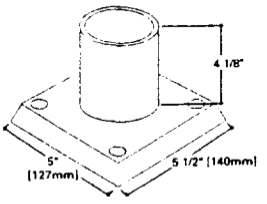
NOTES:
[1] Trunnion and yoke mounts also available.
[2] Pulse Start Metal Halide only.
[3] Products also available in non-US voltages and 50Hz for international markets. Consult factory for availability and ordering information.
[4] Multi-Tap ballast is 120/208/240/277V wired 277V. Triple-Tap ballast is 120/277/347V wired 347V. Add desired voltage before "MT" or "TT".
[5] 200, 250, 320, 350, 400, & 750W.
[6] 200, 250, & 400W.
[7] 277V only, not available with Q or EM option.
[8] 200, 320, 350, & 400W.
[9] HPS & MP only.

NOTE: Specifications and dimensions subject to change without notice.

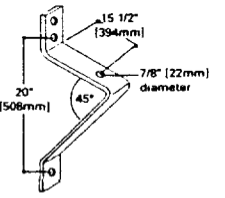
BRACKETS

Brackets for Rooftop or Wall Mounting

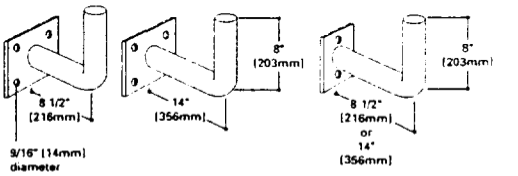
PARAPET BRACKET



STEEL ANGLE BRACKET



RIGHT ANGLE BRACKET



ORDERING INFORMATION

Catalog Number	Tenon Size (In.)	Fixture Configuration
FA63_	3 O.D.	Single Parapet Mount

Catalog Number
SAB

NOTES: Standard finish is hot dip galvanize. Mounting hardware not included.

Catalog Number [1]	Tenon Size (In.)	Bracket Length (In.)
RAB	2 3/8 O.D.	8
RABV	2 3/8 O.D.	14
RABX [2]	2 3/8 O.D.	8
RABX14 [2]	2 3/8 O.D.	14

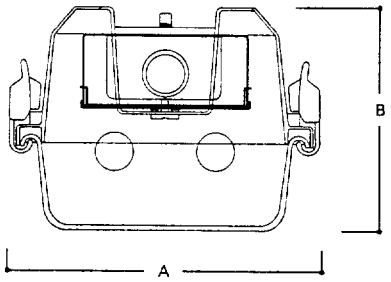
NOTES: [1] Standard finish is primed. Add suffix "G" for hot dip galvanize. Mounting hardware not included. [2] Steel pole mounting

NOTE: Specifications and dimensions subject to change without notice.

METALUX®

INDUSTRIALS

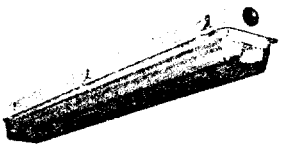
DIMENSIONS



NOMINAL LENGTH	A	B
2', 4', 8'	7" (178mm)	5" (127mm)
4', 8' (HO)	7" (178mm)	5 7/8" (149mm)

DESCRIPTION

The VT2 Series is an energy efficient industrial vaportite fixture that features rugged and durable construction. The VT2 incorporates a full metal fixture housing channel inside a reinforced fiberglass housing with a high impact diffuser and positive cam latching. This Vaportite series is suitable for interior and exterior applications and can be surface or chain mounted. The VT2 Series has been designed for maximum performance in commercial, institutional and industrial environments where weathering, humidity and dust or corrosive fumes are present.



VT2SERIES

2', 4' or 8' Industrial 1 or 2 Lamps

INDUSTRIAL/VAPORTITE

ORDERING INFORMATION

SAMPLE NUMBER: VT2-232DR-120V-EB81-WL-U

- **CAN**= Add "CAN" for CSA Certification
- **Tandem**
  - **8T**=8' Length
- **Series**
  - **VT2**=Vapor-Tite
- **Number of Lamps**
  - **2** Lamps (Not included)
- **Wattage (Length)**
  - **20**=20W (24")
  - **17**=17W T8 (24")
  - **BX40**=40W Biax (24")
  - **BX50**=50W Biax (24")
  - **40**=40W (48")
  - **32**=32W T8 (48")
  - **48**=60W (48") SL
  - **96**=110W (96") HO
  - **96T8**=59W (96") SL)
  - **96T8HO**=85W T8 (96") HO
- **HO**=High Output (800 MA)
- **Lens**
  - **DR**=Internal Prismatic Lens/15% DR High Impact Additive (Standard)
  - **DR-100**=100% High Impact Additive
  - **LEX**=High Impact Clear Polycarbonate LEXAN Lens/Low Brightness Pattern
- **LTS**=Low Trigger Start (20 Watt)
- **Voltage** [2]
  - **120**=120V
  - **277**=277V
  - **347**=347V
- **Ballast Type** [2]
  - **Standard Magnetic Ballast Leave Blank**
  - **LE3**= Energy Saving Ballast®
  - **LEOC8**= Energy Saving Ballast (T-8 Lamp Only)
  - **EB_ _**= Generic Electronic Ballast
    - **No. of Ballasts** **1** or **2**
    - **Lamp Size** **2**=T12 **8**=T8 **5**=T5

  (For Specific Electronic Ballast Specify Brand and Catalog Number)
- **WL**=Wet Label
- **Options**
  - **TH**=Top Hub Only
  - **THE**=Top and End Hubs
  - **SSL**=Stainless Steel latches (See Options and Accessories Page)

PRODUCT INFORMATION

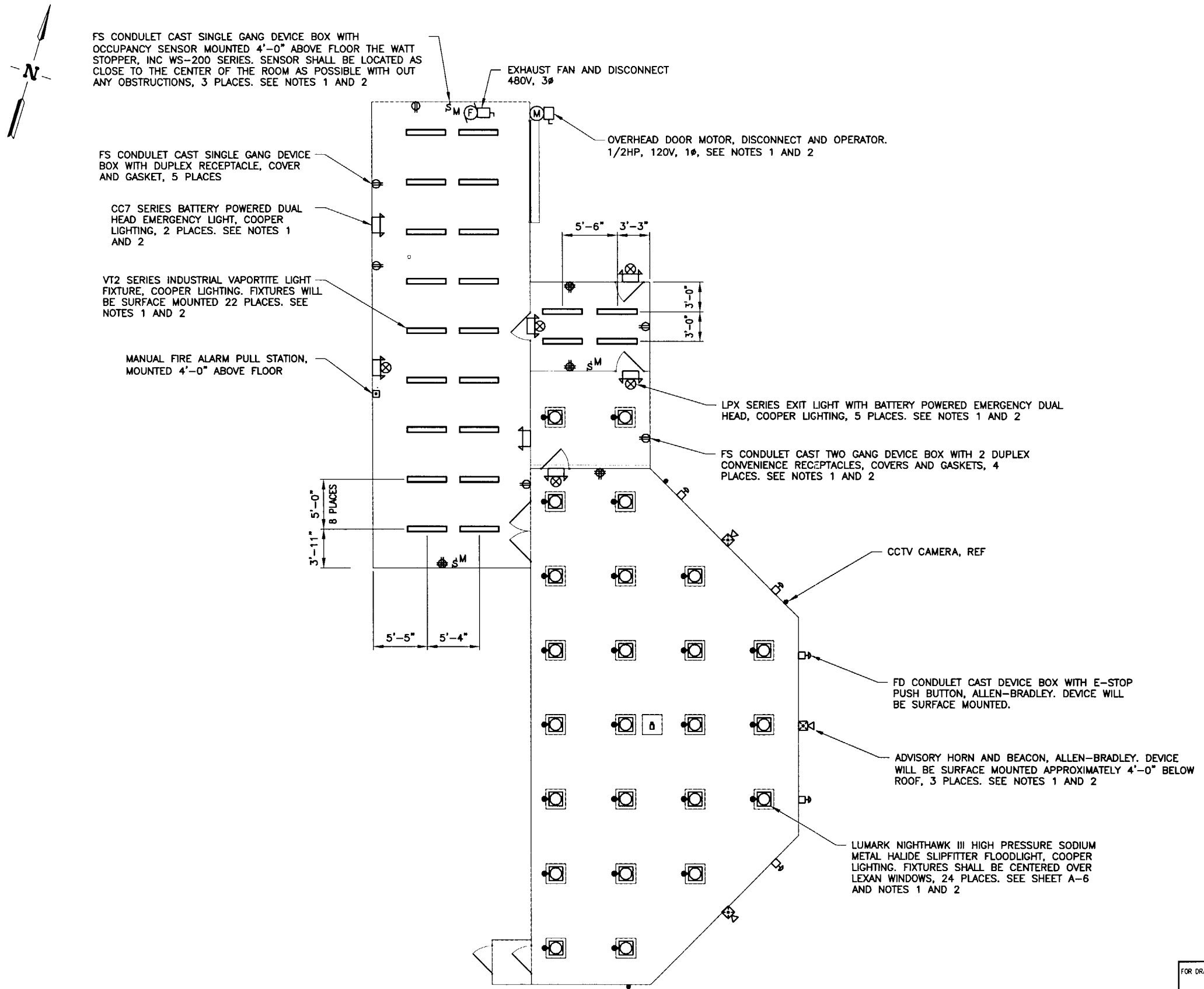
Catalog Number	Lamp Type	Nominal Size	Shipping Wt.
VT2-117 DR-WL	1F17	2'	8 lbs. (3.6kg)
VT2-217 DR-WL	2F17	2'	8 lbs. (3.6kg)
VT2-1BX40 DR-WL	1BX40	2'	8 lbs. (3.6kg)
VT2-1BX50 DR-WL	1BX50	2'	8 lbs. (3.6kg)
VT2-132 DR-WL	1F32	4'	16 lbs. (7.2 kg)
8TVT2-132 DR-WL	2F32	8'	31 lbs. (13.9kg)
VT2-232 DR-WL	2F32	4'	16 lbs. (7.2 kg)
8TVT2-232 DR-WL	4F32	8'	31 lbs. (13.9kg)
VT2-148 DR-WL [1]	1F48	4'	16 lbs. (7.2 kg)
VT2-196HO	1F96HO	8'	35 lbs. (15.8 kg)
VT2-296HO	2F96HO	8'	35 lbs. (15.8 kg)
VT2-196T8 DR-WL	1F96T8	8'	35 lbs. (15.8kg)
VT2-248 DR-WL [1]	2F48	4'	16 lbs. (7.2 kg)
VT2-296T8 DR-WL	2F96T8	8'	35 lbs. (15.8kg)
VT2-148HO DR-WL [1]	1F48HO	4'	20 lbs. (9.0kg)
VT2-248HO DR-WL [1]	2F48HO	4'	20 lbs. (9.0kg)
VT2-196T8HO DR-WL	2F96T8HO	8'	20 lbs. (9.0kg)
VT2-296T8HO DR-WL	2F96T8HO	8'	20 lbs. (9.0kg)

NOTES: [1] Standard ballast (Non-LE3). [2] Products also available in non-US voltages and frequencies for international markets. [3] For complete product data, reference

- Equipped with energy saving ballasts/complies with federal energy efficiency standards
- Reinforced fiberglass housing
- High Impact acrylic/DR diffuser material
- Continuous polyurethane gasketing formed to housing provides a seamless seal
- Watertite hubs standard at each end accepts 1/2" conduit
- Optional top only hub entry or combination top and end hub entry available for stem mounting applications
- Die formed galvanized steel mounting brackets (Standard)
- Baked white enamel finish internal channel/high reflectance
- No holes required for surface/chain mounting
- Unitized internal/external brass mounting stud for structural integrity and continuity of ground
- U.L. Listed for wet locations (standard)
- Luminaire Efficacy Rating LER=FI-73 Catalog Number: VT2-232-DR-WL
- U.L. Listed, CSA Certification Available

FMT-01-REV 3.3

REVISIONS		
REV	DESCRIPTION	EFFECTIVE DATE:



FLOOR PLAN

SCALE: 3/16" = 1'-0"

NOTES

1. THIS DRAWING IS FOR INFORMATION ONLY TO ILLUSTRATE THE LOCATIONS OF PENETRATIONS, LIGHTS, MOTOR, DISCONNECTS, EXHAUST FAN, RECEPTACLES, OCCUPANCY SENSOR AND OTHER SAFETY DEVICES. NOT ALL SURFACE MOUNTED FS AND FD CONDULET CAST DEVICE BOXES, SEALED FITTINGS, ACCESSORIES AND CONDUIT SUPPORTS ARE SHOWN.
2. ALL EQUIPMENT SHOWN SHALL BE INSTALLED BY OTHERS.

X-REF DRAWINGS

519671
519673

FOR DRAWING INDEX SEE DRAWING NO.	SUBCONTRACT NO. N/A	INEEL (Idaho National Engineering & Environmental Laboratory) BECHTEL BWXT IDAHO, LLC
SCALE: 3/16" = 1'-0"	REQUESTER: S A DAVIES	OU 7-10 GLOVEBOX EXCAVATOR METHOD PROJECT RETRIEVAL CONFINEMENT STRUCTURE
	DESIGN: J E DUGGAN	
	DRAWN: D.H. MANWILL	ELECTRICAL AND LIFE SAFETY EQUIPMENT LAYOUT
	PROJECT NO. 021052	
	SPEC CODE	
DESIGN PHASE:	FOR REVIEW/APPROVAL SIGNATURES SEE DAR NO.	SIZE D; CAGE CODE 01MF3; INDEX CODE NUMBER AREA 098 TYPE 0671 SL 10 ORG 090; DWG-; REV
SAFETY CATEGORY:	EFFECTIVE DATE:	SCALE: NOTED; SHEET

File: RCS Elec_LSS Plan.dwg
Path: V:\elec_las
Layout Name: D Size
Date: 04/04/02 - 11:45 A.M.
ID: BBY

Appendix F

Retrieval Confinement Structure Analysis and Loading Criteria

This appendix is for information only. It is not to be considered as part of the specification requirements. If a conflict exists between this Appendix and the body of this specification, the specification will control.

ENGINEERING DESIGN FILE

1. Title: Retrieval Confinement Structure Analysis and Loading Criteria

2. Project File No.: 021052

3. Site Area and Building No.: WMF-671

4. SSC Identification/Equipment Tag No.: WMF-671 RCS

5. Summary:

This EDF documents the structural design and loading requirements for the Retrieval Confinement Structure (RCS) for the OU 7-10 Glovebox Excavator Method Project.

It also gives preliminary estimates of the RCS weight and seismic base shear.

6. Review (R) and Approval (A) and Acceptance (Ac) Signatures:
(See instructions for definitions of terms and significance of signatures.)

	R/A	Typed Name/Organization	Signature	Date
Performer	A	Scott A. Jensen P.E.	Scott A Jensen	3/25/02
Checker	R	Stephanie Austad P.E.	Stephanie Austad	3/25/02
Independent Peer Reviewer	A	Patrick Bragassa P.E.	Patrick Bragassa	3/25/02
Approver	A	S.A. Davies / Project Engineering	Steven A Davies	4/04/02

7. Distribution: (Name and Mail Stop)

Hard copy distribution to: S.A. Davies (MS 3650), M.B. Pratt (MS 3950), OU 7-10 Glovebox Excavator Method Records Management (MS 3920), Scott Jensen, David Stephens. Electronic copy distribution to: B.R. Helm (MS 3765, bxh@inel.gov), OU 7-10 Glovebox Excavator Method Records Management (MS 3920, snarrll@inel.gov), Scott Jensen.

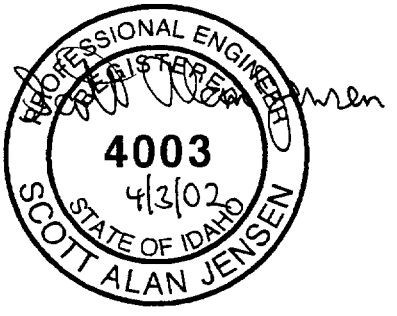
8. Records Management Uniform File Code (UFC): 6400

Disposition Authority: ENV1-k-2-b

Retention Period: End of Project + 25 years

EDF pertains to NRC licensed facility or INEEL SNF program: ☐ Yes ☒ No

9. Registered Professional Engineer's Stamp (if required)



Purpose

This EDF documents the structural design and loading requirements for the Retrieval Confinement Structure (RCS) for the OU 7-10 Glovebox Excavator Method Project.

Scope

This EDF is provides information necessary for the structural analysis and design of the RCS.

Background

The Glovebox Excavator Method Project objective is to demonstrate the safe retrieval of TRU waste from a specific and preselected area (OU 7-10) of Pit 9 in the Subsurface Disposal Area (SDA) at the Radioactive Waste Management Complex (RWMC, part of the INEEL's Waste Area Group (WAG) 7.

The RCS is the confinement structure enclosing the excavation area for this demonstration project.

Safety Category

The RCS is safety significant. It is Performance Category 2 (PC-2) regarding earthquake loading. It is protected from the effects of wind, snow, rain and flood by other structures.

Assumptions

A structural steel framework supports the RCS.
A weather enclosure and other features at the RWMC protect the RCS from the effects of wind, snow, rain and flood.

Acceptance Criteria

The provisions of the International Building Code (IBC) 2000 shall govern the structural design and analysis of the RCS unless otherwise noted herein. The following chapters are particularly applicable to the RCS design:

Chapter 16 Structural Design
Chapter 17 Structural Tests and Special Inspections
Chapter 22 Steel
Chapter 24 Glass and Glazing
Chapter 26 Plastic

Analysis and Design Requirements and Criteria

General. The RCS may be designed and constructed in accordance with any of the design methods and conventional construction methods permitted by the IBC.

Strength. Refer to IBC 1604.2 for requirements.

Serviceability. Refer to IBC 1604.3 for requirements. The drift limits applicable to earthquake loading may be exceeded if adequately justified.

The RCS interfaces with three glovebox structures and an excavator. Flexible connections shall be provided at the interfaces to limit the load transfer between the RCS and these components. The RCS deflections at the connection points shall be limited to a maximum of 3/8 of an inch in any direction.

Analysis. Refer to IBC 1604.4.

Importance Factors. The seismic load importance factor for the RCS shall be 1.5. The snow load and wind load importance factors are not applicable to the RCS design.

Load Combinations. Refer to IBC 1605. Normal operating pressure acting on the RCS shall be considered a live load and shall be included in appropriate load combinations. The normal operating pressure need not be included in load combinations that also include construction or erection live loads. It needs to be included with operational or maintenance live loads.

An additional load combination that includes dead loads and the maximum design pressure on the RCS shall also be used in the design and analysis.

Dead Loads. Refer to IBC 1606. The RCS roof dead load includes selfweight (framing and steel panels, guardrails, etc.), the weight of a camera, the lighting system, and a fire sprinkler system. The minimum assumed dead load from the camera, lights and sprinkler system for the RCS roof shall be the greater of the loads as shown on the drawings or 6 pounds per square foot (psf).

Live Loads. During normal operation the only live load imposed on the RCS is the negative pressure (inward pressure) imposed by the ventilation system. The design value for the normal negative pressure shall be 1 inch of water (5.2 psf).

The live load on the RCS roof shall include a concentrated load of at least 250 lbs. This load is provided to accommodate maintenance of the lights and camera located on the roof. The load may occur at any single location on the RCS roof.

Live loads on the RCS roof shall also include any loading on guardrails or other fall restraint features provided for the RCS erection or maintenance of the lighting and camera.

Live loads shall include loads imposed by normal construction or erection procedures.

Maximum Design Pressure. The maximum negative pressure on the RCS shall be 4 inches of water (20.8 psf).

Snow Loads and Wind Loads. Snow and wind loading are not applicable to the RCS.

The weather enclosure will protect the RCS from snow and wind loading during operations. Snow or wind loading of the RCS may occur during erection. However, temporary bracing can accommodate these loads. The snow or wind loading, during construction activities on individual components, can be assumed to be less than the maximum design pressure (20.8 psf) for those components.

Soil Lateral Load, Rain Loads and Flood Loads. Soil lateral load, rain loads and flood loads are not applicable to the RCS.

Earthquake Loads. Refer to IBC 1613 through 1622. The following criteria shall be used for the RCS.

Short period acceleration, Ss - 0.357 g's
1-sec acceleration, S1- 0.131 g's
Site Class - C
Seismic Importance Factor:
Ie - 1.5 for structures
Ip -1.5 for components
Seismic Use Group - III.

References

International Building Code 2000
DOE-STD-1020-2002 January 2002, Natural Phenomena Hazards Design and Evaluation Criteria for Department of Energy Facilities

Calculations

See the attached calculations for an estimate of the RCS weight and calculations for earthquake loading for the main framework and components.

Conclusions

The preliminary calculation for the weight of the RCS is 39,500 pounds.

The preliminary calculation for the total base shear from earthquake loading of the RCS is 4,230 pounds.

The horizontal design force used for design of anchorage of components mounted on the roof of the RCS shall be at least 0.41 g's (0.41 times the component weight).

Attachments

Loading Calculations – 6 pages

Purpose

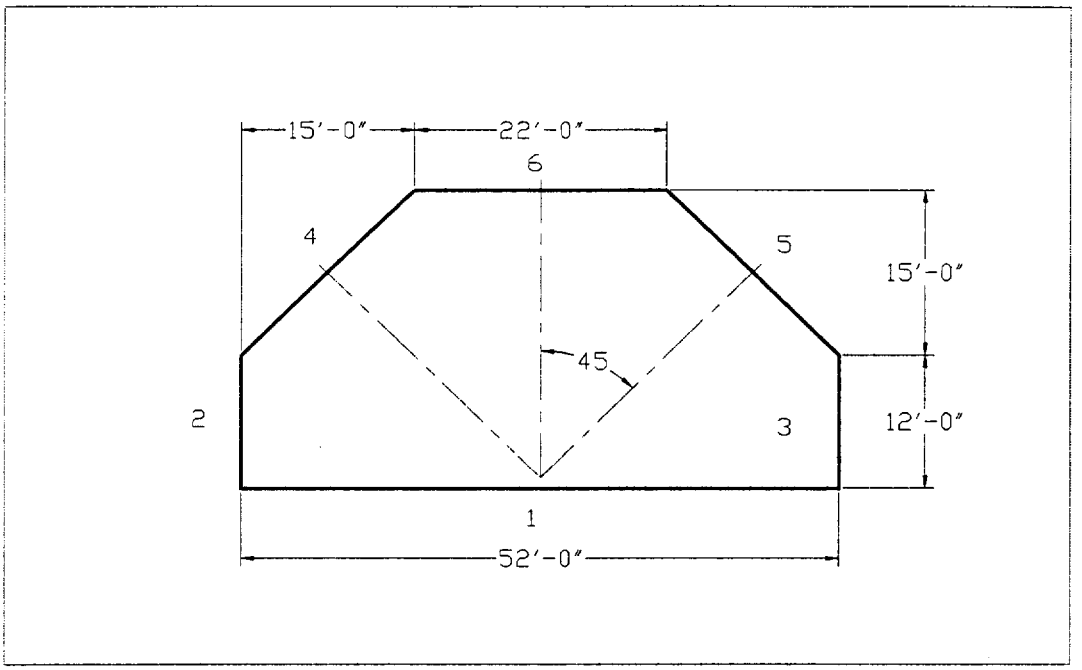
The purpose of these calculations is to determine a preliminary estimate of the weight and earthquake loading of the RCS.

Scope

These calculations are limited to the previously stated purpose.

Assumptions/Criteria Refer to RCS preliminary drawings for information on the RCS configuration.

RCS dimensions: $L := 52 \cdot ft$ $B := 27 \cdot ft$ $H := 24 \cdot ft$ $B1 := 15 \cdot ft$ $B2 := 12 \cdot ft$



$L1 := \sqrt{2 \cdot B1^2}$ $L1 = 21.21\,ft$ $L2 := L - 2 \cdot B1$ $L2 = 22.00\,ft$

Steel unit weight: $\gamma s := 490 \cdot pcf$

Earthquake load criteria: $Ss := 0.357$ $S1 := 0.131$ $Ip := 1.5$ $Ie := 1.5$

Site Class C Seismic Use Group - III

Acceptance Criteria Not applicable to these calculations.

Weight Calculations

Calculate ceiling/roof area $Aceil := L \cdot B - B1^2$ $Aceil = 1179\,ft^2$

Calculate wall areas $A1 := L \cdot H$ $A1 = 1248\,ft^2$

$A2 := B2 \cdot H$ $A2 = 288\,ft^2$

$A3 := A2$

$A4 := L1 \cdot H$ $A4 = 509\,ft^2$

$A5 := A4$

$A6 := L2 \cdot H$ $A6 = 528\,ft^2$

$Awall := A1 + A2 + A3 + A4 + A5 + A6$ $Awall = 3370\,ft^2$

Estimate the RCS Wall Panel Framing

Panel width $Bp := 4 \cdot ft$ Unit weight of water $\gamma w := 62.4 \cdot pcf$

Load $ww := 4 \cdot in \cdot \gamma w \cdot Bp$ $ww = 83.20\,plf$

Assume allowable stress $Fb := .6 \cdot 36 \cdot ksi$ $Fb = 21.60\,ksi$

$Mmax := \frac{ww \cdot H^2}{8}$ $Mmax = 71.88\,kip \cdot in$ $Sx := \frac{Mmax}{Fb}$ $Sx = 3.33\,in^3$ $\frac{Sx}{2} = 1.66\,in^3$

$\Delta := \frac{H}{120}$ $\Delta = 2.40\,in$ $E := 29000 \cdot ksi$ $Ix := \frac{5 \cdot ww \cdot H^4}{384 \cdot \Delta \cdot E}$ $Ix = 8.92\,in^4$

$\frac{Ix}{2} = 4.46\,in^4$

Try C4x7.25 $Sx := 2.29 \cdot in^3$ $Ix := 4.59 \cdot in^4$

$fb := \frac{Mmax}{2 \cdot Sx}$ $fb = 15.70\,ksi$ $\Delta max := \frac{5 \cdot ww \cdot H^4}{384 \cdot E \cdot 2 \cdot Ix}$ $\Delta max = 2.33\,in$

Try C5x6.7 $Sx := 3 \cdot in^3$ $Ix := 7.49 \cdot in^4$

$fb := \frac{Mmax}{2 \cdot Sx}$ $fb = 11.98\,ksi$ $\Delta max := \frac{5 \cdot ww \cdot H^4}{384 \cdot E \cdot 2 \cdot Ix}$ $\Delta max = 1.43\,in$

Estimate the RCS Roof Panel Framing

Roof panel span $Lr := 27 \cdot ft$ $w := ww + 2 \cdot psf \cdot Bp$ $w = 91.20\,plf$

$Mmax := \frac{w \cdot Lr^2}{8}$ $Sx := \frac{Mmax}{Fb}$ $Sx = 4.62\,in^3$ $\frac{Sx}{2} = 2.31\,in^3$

$\Delta := \frac{Lr}{120}$ $\Delta = 2.70\,in$ $E := 29000 \cdot ksi$ $Ix := \frac{5 \cdot w \cdot Lr^4}{384 \cdot \Delta \cdot E}$ $Ix = 13.93\,in^4$

$Mmax = 99.73\,kip \cdot in$ Try C5x6.7 $\frac{Ix}{2} = 6.96\,in^4$

$fb := \frac{Mmax}{2 \cdot Sx}$ $fb = 10.80\,ksi$ $\Delta max := \frac{5 \cdot ww \cdot Lr^4}{384 \cdot E \cdot 2 \cdot Ix}$ $\Delta max = 1.23\,in$

$\frac{Lr}{240} = 1.35\,in$

Estimate weight per square foot of RCS panels

Assumed panel area $Ap := 4 \cdot ft \cdot H$ $Ap = 96.00\,ft^2$

Thickness of panel sheet $ts := 0.0598 \cdot in$ Assumes 16 gage or lighter $ws := ts \cdot \gamma s$ $ws = 2.44\,psf$

Length of angle framing per panel $Lap1 := 6 \cdot 4 \cdot ft$ $Lap1 = 24.0\,ft$

$Lap2 := 2 \cdot H + 2 \cdot 4 \cdot ft$ $Lap2 = 56.0\,ft$

Framing weight per foot $wap1 := 3.07 \cdot plf$ Assumes 3x2x3/16 angles

$wap2 := 6.7 \cdot plf$ Assmes C5x6.7

$Wa := wap1 \cdot Lap1 + wap2 \cdot Lap2$ $Wa = 448.88\,lbf$

Total weight of panel $Wpanel := Wa + Ap \cdot ws$ $Wpanel = 683.30\,lbf$

Weight per square foot of panels $wpa := \frac{Wpanel}{Ap}$ $wpa = 7.12\,psf$

Estimate weight of lights and fire sprinkler system Lights $\frac{22 \cdot 60 \cdot lbf}{Aceil} = 1.12\,psf$

Assume 4 psf for the sprinkler system $wco := 6 \cdot psf$

Ceiling weight $Wceil := Aceil \cdot (wpa + wco)$ $Wceil = 15.47\,kip$

Wall weight $Wwall := Awall \cdot wpa$ $Wwall = 23.99\,kip$

$Ww1 := A1 \cdot wpa$ $Ww2 := A2 \cdot wpa$ $Ww3 := A3 \cdot wpa$ $Ww4 := A4 \cdot wpa$

$Ww5 := A5 \cdot wpa$ $Ww6 := A6 \cdot wpa$

$Ww1 + Ww2 + Ww3 + Ww4 + Ww5 + Ww6 = 23.99\,kip$

RCS Structure Earthquake Loading Calculations

$Ss = 0.36$ $S1 = 0.13$ $Fa := 1.2$ See IBC Table 1615.1.2(1)

$Fv := 1.67$ See IBC Table 1615.1.2(2)

Equation 16-16 $Sms := Fa \cdot Ss$ $Sms = 0.43$

Equation 16-17 $Sm1 := Fv \cdot S1$ $Sm1 = 0.22$

Equation 16-18 $Sds := \frac{2}{3} \cdot Sms$ $Sds = 0.29$ Equates to Seismic Design Category D

Equation 16-19 $Sd1 := \frac{2}{3} \cdot Sm1$ $Sd1 = 0.15$ See Table 1616.3

$Ct := 0.020$ Equation 16-39 $Ta := Ct \cdot \left(\frac{H}{ft}\right)^{\frac{3}{4}}$ $Ta = 0.22$

$R := 4$ See Table 1617.6 Bearing Wall System - Ordinary steel braced frames

$Cs1 := \frac{Sds}{\left(\frac{R}{Ie}\right)}$ Equation 16-35 $Cs1 = 0.11$

$Csmin := 0.044 \cdot Sds \cdot Ie$ Equation 16-37 $Csmin = 0.02$

$Csmax := \frac{Sd1}{\left(\frac{R}{Ie}\right) \cdot Ta}$ Equation 16-36 $Csmax = 0.25$

$Cs := if(Cs1 < Csmin, Csmin, if(Cs1 > Csmax, Csmax, Cs1))$ $Cs = 0.11$

Seismic Base Shear (Equation16-34) $V := Cs \cdot (Wwall + Wceil)$ $V = 4.23\,kip$

$Vceil := Cs \cdot Wceil$ $Vw1 := Cs \cdot Ww1$ $Vw2 := Cs \cdot Ww2$ $Vw3 := Cs \cdot Ww3$

$Vw4 := Cs \cdot Ww4$ $Vw5 := Cs \cdot Ww5$ $Vw6 := Cs \cdot Ww6$

$Vceil + Vw1 + Vw2 + Vw3 + Vw4 + Vw5 + Vw6 = 4.23\,kip$ $Vceil = 1.66\,kip$

Estimate the distribution of the seismic base shear

Direction parallel to RCS length $yceil := B - \frac{B \cdot (2 \cdot L + L2)}{3 \cdot (L + L2)}$ $yceil = 11.68\,ft$

$yw2 := \frac{B2}{2}$ $yw2 = 6.00\,ft$ $yw4 := B2 + \frac{B1}{2}$ $yw4 = 19.50\,ft$

$yc := \frac{yceil \cdot Vceil + Vw2 \cdot yw2 + Vw3 \cdot yw2 + Vw4 \cdot yw4 + Vw5 \cdot yw4 + Vw6 \cdot B}{V}$ $yc = 11.35\,ft$

Force on Wall 1 $Fx1 := \frac{V \cdot (B - yc)}{B}$ $Fx1 = 2.45\,kip$

$Fx1ceil := \frac{Vceil \cdot (B - yceil)}{B}$ $Fx1ceil = 0.94\,kip$ $Fx1w := Fx1 - Fx1ceil$

Moment on Wall 1 $Mx1 := Fx1ceil \cdot H + Fx1w \cdot \frac{H}{2}$ $Mx1 = 40.66\,kip \cdot ft$

Wall 1 base maximum base pressure $pw1 := \frac{6 \cdot Mx1}{L^2}$ $pw1 = 90\,plf$

Maximum vertical force (use the greater of) $\frac{Mx1}{L} = 0.78\,kip$ $Fx1 = 2.45\,kip$

Force on Wall 6 $Fx6 := \frac{V \cdot yc}{B}$ $Fx6 = 1.78\,kip$

$Fx6ceil := \frac{Vceil \cdot yceil}{B}$ $Fx6ceil = 0.72\,kip$ $Fx6w := Fx6 - Fx6ceil$

Moment on Wall 6 $Mx6 := Fx6ceil \cdot H + Fx6w \cdot \frac{H}{2}$ $Mx6 = 29.92\,kip \cdot ft$

Wall 6 base maximum base pressure $pw6 := \frac{6 \cdot Mx6}{L2^2}$ $pw6 = 371\,plf$

Maximum vertical force (use the greater of) $\frac{Mx6}{L2} = 1.36\,kip$ $Fx6 = 1.78\,kip$

Checks $Fx1 + Fx6 = 4.23\,kip$ $V = 4.23\,kip$ $Vwall := V - Vceil$

$Fx1ceil + Fx6ceil = 1.66\,kip$ $Vceil = 1.66\,kip$ $Fx1w + Fx6w = 2.57\,kip$ $Vwall = 2.57\,kip$

Direction perpendicular to RCS length

$xc := \frac{L}{2}$ $xc = 26.00\,ft$

Force on Wall 2 or 3 $Fy2 := \frac{V \cdot xc}{L}$ $Fy2 = 2.11\,kip$ $\frac{V}{2} = 2.11\,kip$

$Fyceil := \frac{Vceil}{2}$ $Fyceil = 0.83\,kip$ $Fyw := \frac{Vwall}{2}$ $Fyw = 1.28\,kip$

Moment on Wall 2 or 3 $My := Fyceil \cdot H + Fyw \cdot \frac{H}{2}$ $My = 35.29\,kip \cdot ft$

Wall 2 or 3 base maximum base pressure $pw2 := \frac{6 \cdot My}{B2^2}$ $pw2 = 1470\,plf$

Maximum vertical force (use the greater of) $\frac{My}{B2} = 2.94\,kip$ $Fy2 = 2.11\,kip$

RCS Structure Wall Out-Of-Plane Earthquake Loading Calculations

$Fp := 0.40 \cdot Ie \cdot Sds \cdot wpa$ Equation 16-63 $Fp = 1.22\,psf$

$0.40 \cdot Ie \cdot Sds = 0.17$ Uniform force on a panel assuming 4 foot wide panel

$Fp1 := Fp \cdot 4 \cdot ft$ $Fp1 = 4.88\,plf$

Total seismic force per panel $Fp1 \cdot H = 117.09\,lbf$

RCS Earthquake Loading Calculations for Components Supported by the Ceiling

$ap := 1.0$ $Rp := 1.25$ $z := H$

$Fpf1 := \frac{0.4 \cdot ap \cdot Sds}{\frac{Rp}{Ip}} \cdot \left(1 + 2 \cdot \frac{z}{H}\right) Wp$ $Fpf1 = 0.41$ x weight Equation 16-67

$Fpmax := 1.6 \cdot Sds \cdot Ip$ $Fpmax = 0.69$ Equation 16-68

$Fpmin := 0.3 \cdot Sds \cdot Ip$ $Fpmin = 0.13$ Equation 16-69

$Fpf := if(Fpf1 < Fpmin, Fpmin, if(Fpf1 > Fpmax, Fpmax, Fpf1))$ $Fpf = 0.41$ x weight

Conclusions

Total weight of the RCS is approximately $Wceil + Wwall = 39.45\,kip$

Seismic base shear for the RCS is approximately $V = 4.23\,kip$

Total out-of-plane force on a typical wall panel is $Fp1 \cdot H = 117\,lbf$

The maximum g force for attachment of lighting and piping to the RCS is $Fpf = 0.41$

See the base shear distribution estimates for forces on the FFS for earthquake loading. The maximum vertical force from the earthquake load is approximately 3 kips. That is less than the design wheel load for the FFS floor of 3.2 kips.

Appendix G

Form 540.04 Certificate of Conformance

540.04
02/07/2002
Rev. 03

CERTIFICATE OF CONFORMANCE

NOTE: Prior to completing this certification, the Supplier shall review and comply with the attached **form instructions**.

A. A. Purchase Order/Contract Data		
1. PO No.:	2. PO Rev No.:	3. PO Line Item:
4. Contract No.:	5. Contract Amendment No.:	
B. Supplier/Source Information		
6. Supplier:	7. Supplier Address (Street/City/State):	
8. Source of Origin: Street: _____ City: _____ State: _____ Country: _____	**CAUTION:** The suppliers shall take all necessary actions and precautions to assure that this Certificate of Conformance(C of C) is accurate, complete, and true, regardless of the actual source of origin.	
C. Applicable Requirements		
9. Code/Standard No.:	Revisions/Editions/Addendum:	
10. Specification No.:	Revision/Editions:	
11. Technical Drawings/Diagrams:	Revision:	
12. Other:	Revisions/Editions/Addendum:	

D. Approved Changes/Deviations/Waivers/Substitutions/Nonconformances:

E. Nonconformance(s): Unless otherwise directed in writing by the Procurement Agent, Do NOT deliver/ship materials/items/equipment if there are any changes, deviations, substitutions, or nonconforming conditions that have not been previously submitted and approved utilizing Contractor Form 540.16, Interface Document.

F. Certification Statement

_____ (Supplier), hereby certifies that the materials/items/equipment identified in **Section A** above, and all required documentation, conforms in all respects to the stated Purchase Order/Contract requirements and that all exceptions, waivers, deviations, and/or nonconforming conditions are identified in **Section D**. Furthermore, information provided is accurate, complete, and true pursuant to 10 CFR 820.11 (see definition).

Authorized Certifying Official (See Definitions/Instructions):

Printed Name	Signature	Title	Date

See Instructions

C of C is Limited To One Page. Attached Additional Pages On Supplier Letter Head If Required.

CERTIFICATE OF CONFORMANCE

Instructions

General

Prepare a Certificate of Conformance (C of C) addressing each Purchase Order line item, Contract Deliverable, and/or each partial shipment. Unless otherwise specified, the C of C shall accompany each shipment. All applicable form entries must be completed.

A Supplier system-generated C of C may be attached and referenced. All applicable information required on form 540.04 shall be accounted for. Section **A** and Section **F** shall be completed in their entirety, regardless of any attachments used.

Definitions

Authorized Company Certifying Official. The certification shall be attested to by an authorized representative of the supplier; and the certification system, including the procedures for completing, reviewing, and approving the certificate shall be described in the Company's administrative control system.

Certification. The act of determining, verifying, and attesting in writing to the qualifications of personnel, processes, procedures, or items in accordance with specified requirements.

Certificate of Conformance. A document signed or otherwise authenticated by an authorized individual certifying the degree to which items or services meet specified requirements.

10 CFR 820.11. Procedural Rules for DOE Nuclear Activities, Subpart "A", Information requirements. The regulation states:

> (a) Any information pertaining to a nuclear activity provided to DOE by any person or maintained by any person for inspection by DOE shall be complete and accurate in all material respects.
> (b) No person involved in a DOE nuclear activity shall conceal or destroy any information concerning a violation of a DOE Nuclear Safety Requirement, a Nuclear Statute, or the Act.

Instructions

Section A, Purchase Order(PO)/Contract Data

Entry 1 — Enter the complete INEEL Purchase Order (PO) number.

Entry 2 — Enter PO Revision Number (if applicable).

Entry 3 — Enter the PO Line Item Number, i.e., 1, 2, 3, etc....

Entry 4 — Enter the INEEL Contract Number (if not a PO).

Entry 5 — Enter the latest Contract Amendment Number (if applicable).

Section B, Supplier/Source Information

Entry 6 — Enter the legal Supplier company name, as stated on the PO or Contract.

Entry 7 — Enter the Supplier business address, as stated on the PO or Contract.

Entry 8 — Enter the point of shipping origin by city, state, and country if different than Block 7. The point of origin shall be the originating location from which final shipment/delivery to the INEEL is made. If different than Block 7, see CAUTION statement.

Section C, Applicable Requirements

Entry 9 — Enter the applicable design code or consensus standard and revision, edition, or addendum.

Entry 10 — Enter the applicable specification and revision, edition, or addendum.

Entry 11 — Enter the applicable technical drawing/diagram and applicable revision, edition, or addendum.

Entry 12 — Enter Other applicable requirements documents and revision, edition, or addendum.

CERTIFICATE OF CONFORMANCE

Section D, Approved Changes/Deviations/Waivers/Substitutions/Nonconformances

Enter any approved changes. Reference change documentation control numbers as applicable. (Attach additional pages if necessary).

Section E, Nonconformance(s)

Self Explanatory.

Section F, Certification Statement (see definitions)

Enter the Company name (or commonly used acronym).

Print or type the authorized company certifying officials name, title, and date.

Affix certifying official signature (indelible ink only - no stamps).